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onderwerp	deelonderzoek windturbines (energieopbrengsten, geluid en slagschaduw)
project	MER Windpark Krammer
opdrachtgever	Rho Adviseurs
projectcode	SCHD18-1
referentie	SCHD18-1/14-006.559
opgemaakt door	ing. M. Andel
goedgekeurd door	ir. E.H. Voors
status	definitief 06
datum opmaak	27 maart 2014
bijlagen	I opstelling II energie III slagschaduw IV geluid V ecologie

paraaf



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1. INLEIDING

In voorliggende notitie worden in het kader van de milieueffectrapportage 'Windpark Krammer' de deelaspecten energie, geluid en slagschaduw behandeld. Berekend worden de verwachte energieopbrengst, de geluidbelasting ter plaatse van woningen en natuurbeschermingsgebieden en de optredende slagschaduw ter plaatse van de woningen. Ter informatie worden de aspecten geluid en slagschaduw ook bij de overnachtingsplaatsen berekend.

2. WETTELIJK KADER

2.1. Geluid

2.1.1. Normstelling

Het toetsingskader voor geluid voor de windturbines van Windpark Krammer staat in paragraaf 3.2.3 van het Activiteitenbesluit. De normstelling geldt voor de jaargemiddelde geluidimmissie ter plaatse van geluidgevoelige bestemmingen. De L_{den} (day, evening, night) mag maximaal 47 dB bedragen. Daarnaast geldt voor de nachtperiode een aparte norm L_{night} van 41 dB. Voor moderne windturbines geldt dat wanneer voldaan wordt aan de L_{den} , vrijwel altijd ook wordt voldaan aan de L_{night} . De L_{night} wordt pas maatgevend wanneer de gemiddelde windsnelheid het hoogst is in de nachtperiode. Dit is echter over het algemeen over een lange periode niet het geval. In voorliggende notitie is L_{night} volledigheidshalve wel meegenomen in de berekeningen.

De norm geldt zowel voor een enkele windturbine als een groep windturbines welke tot dezelfde 'inrichting' behoren. Door het stellen van maatwerkvoorschriften kan het bevoegd gezag zowel lagere (artikel 3.14a lid 2) als hogere (artikel 3.14a lid 3) normen vast stellen. De normstelling is gebaseerd op perceptieonderzoek naar windturbinegeluid. Hierdoor is het bij moderne windturbines niet nodig straffactoren voor bijvoorbeeld tonaal geluid toe te passen. Dit is immers al verwerkt in de normstelling. Voor ouderwetse windturbines kan dit wel het geval zijn. Aangezien Windpark Krammer een nieuwe situatie betreft, is uitgegaan van plaatsing van moderne windturbines waarvoor geen extra straffactoren van toepassing zijn.

Verder veroorzaken windturbines vrijwel nooit geluidpieken. Wel kan het draaien van de gondel en het bij harde wind aftoeren van de van de turbine hoorbaar zijn. Dit is echter met name herkenbaar doordat het geluid afwijkt van de normale bedrijfsvoering en niet vanwege een veel hoger geluidsniveau. Vanwege het ontbreken van duidelijke piekgeluiden is hier binnen het wettelijk kader geen normstelling voor opgenomen.

2.1.2. Rekenmethode

Het berekenen van geluid van windturbines vindt plaats conform het 'Reken en meetvoorschrift windturbines' uit 2011. Specifiek voor windturbines is de bepaling van de emissieterm. De emissieterm (L_E) is het jaargemiddelde geluidsvermogen van de turbine. De term wordt berekend aan de hand van windsnelheidsafhankelijke geluidsvermogen van de installatie en de lokale langjaargemiddelde windsnelheidsverdeling op ashoogte. De windsnelheidsverdeling op ashoogte wordt per turbine gedownload door de rekensoftware.

De overdrachtsberekening is identiek aan die van de 'Handleiding meten en rekenen industrielawaai'. Het enige verschil met 'gewoon' industrielawaai is de meteocorrectie-term. De aangepaste formule voor de bepaling van de meteocorrectie leidt tot iets andere waarden (enkele honderdsten) vanaf 10 maal de ashoogte. Dit betreft dus al snel afstanden van meer dan 1 km.

2.2. Slagschaduw

2.2.1. Normstelling

Slagschaduw ontstaat wanneer de zon schijnt op de draaiende rotor van een windturbine. Hierdoor ontstaat een draaiende schaduw op de grond of ter plaatse van bijvoorbeeld woningen. Wanneer dit ter plaatse van een raam plaatsvindt, kan dit in de woning als hinderlijk ervaren worden. Slagschaduw kan voorkomen worden door de turbines te voorzien van een stilstandvoorziening.

In de ministeriële regeling van 9 november 2007 met nummer DJZ 2007104180 is de normstelling bepaald voor slagschaduw. Hierin is bepaald dat een windturbine over een stilstandvoorziening moet beschikken indien:

- zich woningen bevinden binnen de afstand van twaalf maal de rotordiameter van de windturbine en
- gemiddeld meer dan zeventien dagen per jaar en meer dan twintig minuten per dag slagschaduwhinder op kan treden ter plaatse van ramen van geluidgevoelige bestemmingen en woonwagens (zogenoemde gevoelige objecten).

Laatstgenoemde eis wordt als volgt geïnterpreteerd: Aangezien het een gemiddelde betreft, wordt uitgegaan van het gemiddeld aantal zonuren als opgegeven door het KNMI. Omdat niet te bepalen is hoeveel minuten slagschaduw per keer plaatsvindt¹, wordt getoetst aan een verwachte slagschaduwduur van $18 * 20 = 360$ minuten, oftewel zes uren. Deze rekenwijze wordt hierna **real-case** genoemd. De real-case is strenger dan de wettelijke eis, aangezien in de real-case alle slagschaduwminuten zijn meegenomen, dus ook de dagen dat het minder dan 20 minuten optreedt.

Uit de toelichting op het Activiteitenbesluit blijkt voorts dat maximaal 64 dagen met 20 minuten per dag slagschaduw toelaatbaar is. Dit is als volgt geïnterpreteerd: Wanneer voldaan wordt aan de eis met betrekking tot het gemiddelde, wordt gekeken of voldaan wordt aan het wettelijke maximum van 64 dagen met 20 minuten per dag slagschaduw. Hierbij wordt uitgegaan van de **worst-case** situatie, oftewel dat het altijd onbewolkt is. Wanneer dit meer dan 64 dagen zijn, is alsnog een stilstandvoorziening noodzakelijk.

Slagschaduw wordt pas relevant vanaf een stand van 5 graden boven de horizon. Dit omdat bij zonsopkomst en zonsondergang het licht en daarmee de schaduwen diffuus zijn. Bij lagere hoeken wordt derhalve geen slagschaduw berekend.

2.2.2. Rekenmethode

Potentiële hinderduur

Middels berekeningen is vast te stellen op welke dagen en op welk moment van de dag slagschaduw op kan treden. Op basis hiervan wordt getoetst aan het criterium van maximaal 64 dagen van 20 minuten per dag. Dit betekent niet dat op dat moment van die specifieke dag zich slagschaduw hinder voor doet. Slagschaduw hinder treedt op die momenten alleen op wanneer:

- het onbewolkt is;
- de wind voldoende hard waait om de rotor te laten draaien;
- de windrichting min of meer in lijn met de zon staat, zodat de rotorbladen haaks op de lijn tussen de zon en de woning zijn gesitueerd.

Verwachte hinderduur

Op basis van meteorologische statistieken van het KNMI wordt het gemiddelde bepaald en getoetst aan de eis uit de ministeriële regeling dat maximaal 17 dagen per jaar, ten hoogste 20 minuten per dag slagschaduw hinder op mag treden. Het model kan alleen de totale verwachte slagschaduw hinder berekenen. Worst cast wordt ervan uitgegaan dat de eis overschreden wordt wanneer meer dan $18 * 20 = 360$ minuten (6 uur) slagschaduw hinder optreedt bij een gevoelig object.

De windturbine wordt bij mogelijke overschrijding uitgerust met een stilstandvoorziening, die geïmplementeerd is in de besturingssoftware. Hierdoor schakelt de turbine alleen uit als slagschaduw daadwerkelijk optreedt. Wanneer er per jaar minder dan 6 uren slagschaduw kan optreden, wordt de stilstandvoorziening niet geïmplementeerd.

¹ Dit wordt niet ondersteund door het programma WindPro versie 2.7.490.

3. UITGANGSPUNTEN

3.1. Alternatieven

Het onderscheid tussen de alternatieven bestaat uit typen en aantallen windturbines en de situering. De verschillende kenmerken zijn opgenomen in de navolgende tabel.

Tabel 3.1. Te onderzoeken alternatieven

alternatief	naam	aantal en typen turbines	ashoogte (m)	totaal opgesteld vermogen
1	enkele lijn	- 16 turbines van 3 MW - 9 turbines van 6 MW	80 120	102 MW
2	dubbele lijn	- 35 turbines van 3 MW	80	105 MW
3	dubbele wolk	- 39 turbines van 3 MW	80	117 MW
4	grote wolk	- 50 turbines van 3 MW	122	150 MW
5	wolk	- 32 turbines van 3 MW	80	96 MW
6	VKA	- 35 turbines van 3 MW	122	105 MW

Voor een afbeelding van de alternatieven wordt verwezen naar bijlage I.

3.2. Windturbines

Op de markt zijn vele merken en typen windturbines beschikbaar. Maatgevend voor het toekomstige Windturbinepark zijn de volgende windturbintypen.

Tabel 3.2. Geselecteerde typen turbines

theoretisch	in praktijk gebruikt voor berekeningen					
tabel 3.1	fabrikant	type	vermogen	hubhoogte	rotordiameter	maximaal geluid- vermogen
3 MW / 80 m	Siemens	SWT 3.0	3 MW	79,5 m	101 m	107
3 MW 122 m	Siemens	SWT 3.0	3 MW	122,5 m	113 m	106
6 MW / 120 m	REpower	6M	6 MW	117 m	126 m	109

3.3. Omgeving

De omgeving van het windpark is te kenmerken als open en landelijk. Er is één (bedrijfs)woning welke duidelijk het meest nabijgelegen is. Dit is de woning behorende bij het Restaurant Grevelingen. Gezien de nabije situering zal deze woning maatgevend zijn voor de onderdelen slagschaduw en geluid. Een andere nabijgelegen woning is de woning behorende bij restaurant Meerzicht. Deze ligt in een aantal alternatieven binnen 1 kilometer van een aantal turbines. De overige woningen liggen op een afstand van minimaal 1 kilometer van de dichtstbijgelegen turbine.

In het Advies Reikwijdte & Detailniveau is gevraagd naar de milieueffecten ter plaatse van de overnachtingsplaatsen voor binnenvaartschepen, alsmede voor de effecten op de visserijactiviteiten (MZI's, oester- en mosselpercelen) en het haventje aan de Grevelingendam. Deze locaties zijn geen gevoelige objecten in de zin van het Activiteitenbesluit. Een norm waaraan de geluidsbelasting of potentiële slagschaduw-hinder vanuit het windpark kan worden getoetst voor deze objecten ontbreekt zodoende. Voor geluidhinder wordt daarom enkel getoetst aan de referentiesituatie (autonome ontwikkelingen). Ten aanzien van het aspect slagschaduw wordt volstaan met een beschrijving van de uitkomsten.

Een overzichtsaafbeelding met daarop de locatie van de overnachtingsplaatsen voor de binnenvaart is weergegeven in bijlage III.

3.4. Overige bronnen

Er wordt voor het windpark een transformatorstation gerealiseerd met een aantal in pandig opgestelde geluidsbronnen. Gezien de situering, afstand en in pandige opstelling, zal geen geluid waarneembaar zijn ter plaatse van geluidsgevoelige bestemmingen. Het transformatorstation maakt derhalve geen onderdeel uit van de berekeningen.

4. BEREKENINGEN EN RESULTATEN

4.1. Modellen

Voor het bepalen van de energieopbrengst en de slagschaduw is gebruik gemaakt van het programma WindPro versie 2.7.490. Voor de geluidberekeningen is WindPro niet geschikt, aangezien de methodiek niet voldoende aansluit bij de Nederlandse regelgeving. Voor geluid is daarom gebruikt gemaakt van Geomilieu 1.91.

Het akoestisch bronvermogen van de windturbines is bepaald aan de hand van het Reken- en meetvoorschrift, akoestische gegevens van Siemens en REpower en het windprofiel op locatie van het KNMI. Van de Siemens turbine is naast het bronvermogen ook de spectrale verdeling van het geluid aangeleverd. Van REpower is dit niet bekend, zodat gebruik gemaakt is van een gemiddelde verdeling voor turbines.

4.2. Referentiesituatie

De geluidniveaus in de referentiesituatie op de beoordelingspunten worden veroorzaakt door de nabijgelegen wegen N59 (oostelijk deel circa 12.000 / westelijk deel 13.000 mvt/etmaal) en N257 (4.000 mvt/etmaal) en het geluid afkomstig van de scheepvaart (288 bewegingen/etmaal) door het sluizencomplex. Voor alle beoordelingspunten, met uitzondering van beide bedrijfswoningen van de restaurants, geldt dat het geluidniveau in de referentiesituatie ruim beneden de voorkeursgrenswaarde voor wegverkeer van 48 dB is gelegen. Voor het onderzoek is de beoordeling van de referentiesituatie op deze punten verder dan ook niet meegenomen. Het gecumuleerde geluidniveau is daarom alleen voor de bedrijfswoningen weergegeven.

Tabel 4.1. Geluid cumulatief referentiesituatie

beoordelingspunt	Lden wegverkeer	Lden scheepvaart	Lden cumulatief
1 tot en met 7	< 48	n.v.t.	n.v.t.
8: bedrijfswoning Grevelingen	53,2	51,4	55
9 tot en met 15	< 48	n.v.t.	n.v.t.
16: bedrijfswoning Meerzicht	49	33,8	49,4
21 tot en met 24	48	circa 63 dB	circa 63

4.3. Energie

Voor de alternatieven is de verwachte energieopbrengst bepaald met de modules 'Meteo' en 'Park' van WindPro. In deze module wordt de windsnelheid, standaarddeviatie en richting op ashoogte op basis van metingen bepaald en wordt de onderlinge beïnvloeding van de windturbines berekend. De gegevens met betrekking tot de opwekking van energie per windsnelheid (powercurve) zijn opgenomen in WindPro. Voor de meteorologische

gegevens is uitgegaan van waarnemingen van het KNMI (station Wilhelminadorp). Het betreft uurwaarden voor richting en gemiddelde windsnelheid over een periode van 21 jaar en vijf maanden. Dit voldoet aan de door de softwarefabrikant geadviseerde te hanteren periode van minimaal 20 jaar.

De opbrengst is verder afhankelijk van de omgeving. Als stelregel geldt dat objecten binnen een kilometer de windsnelheid op ashoogte relevant kunnen beïnvloeden als deze minimaal $\frac{1}{4}$ van de hoogte hebben tussen het maaiveld en de onderste tip van de turbine. Voor de Siemens betreft het objecten van 7,5 of 16,5 m of hoger, voor de REpower 14 m. Gezien de situering van het plangebied en de directe omgeving is er van dergelijk hinderlijke objecten nauwelijks sprake.

Voor de gemiddelde windsnelheid is gebruik gemaakt van de Windkaart van Nederland welke opgesteld is door SenterNovem. Voor de windrichtingen en standaarddeviatie is gebruik gemaakt van de meetgegevens van het nabijgelegen KNMI station Wilhelminadorp. De resultaten van de alternatieven zijn opgenomen in onderstaande tabel. Hierbij is uitgegaan van een reductie van maximaal 5 % voor verliezen als gevolg van storingen en onderhoud. Dit verlies is bij modelberekeningen vooraf nooit exact te bepalen, aangezien niet bekend is hoe vaak dit zal optreden en wat de windsnelheid is op het moment dat het optreedt.

Tabel 4.2. Energieopbrengsten*

alternatief	resultaat MWh/jaar zonder invloed park	resultaat MWh/jaar met invloed park	score	efficiëntie	score	gemiddeld per turbine MWh/jaar
enkele lijn	384.406	339.255	+	88,3 %	+	13.570
dubbele lijn	396.144	330.563	+	83,4 %	o	9.444
dubbele wolk	441.418	363.824	+	82,4 %	o	9.328
grote wolk	730.611	551.499	++	75,5 %	-	11.030
wolk	362.189	298.096	+	82,3 %	o	9.315
VKA	511.428	411.911	+ / ++	80,5 %	o	11.768

* Rekening houdende met een verlies van 5 % als gevolg van storingen en onderhoud.

Uit de tabel blijkt dat met de toename van het aantal turbines de opbrengst weliswaar toeneemt, maar dat dit getemperd wordt door het verlies in efficiëntie. Voor een meer gedetailleerde weergave van de resultaten wordt verwezen naar bijlage II. Hierin is onder andere de opbrengst per turbine opgenomen.

In onderstaande tabel is aangegeven hoeveel luchtemissies wordt vermeden dankzij het gebruik van de windturbines. Daarbij is gerekend met:

- 0,61 kg CO₂/kWh-e, conform het Protocol Monitoring Hernieuwbare Energie¹;
- 0,07 kg NO_x/kWh-e respectievelijk 0,02 kg SO₂/kWh-e, conform ECN².

¹ Agentschap, mei 2010, Protocol Monitoring Hernieuwbare Energie, update 2010.

² ECN, november 2005, Monitoring Nederlandse elektriciteitscentrales 2000-2004.

Tabel 4.3. Vermeden luchtemissies

opstelling	resultaat MWh/jaar met invloed park	vermeden uitstoot ton CO ₂ /j	vermeden uitstoot ton NO _x /j	vermeden uitstoot ton SO ₂ /j	score
enkele lijn	339.255	206.267	23.917	7.294	+
dubbele lijn	330.563	200.982	23.305	7.107	+
dubbele wolk	363.824	221.205	25.650	7.822	+
grote wolk	551.499	335.311	38.881	11.857	++
wolk	298.096	181.242	21.016	6.409	+
VKA	411.911	250.442	29.040	8.856	+ / ++

De opstelling grote wolk leidt dankzij de hogere energie opbrengst tot hogere vermeden luchtemissies en scoort daarom het meest gunstig. De vermeden luchtemissies van de overige drie alternatieven liggen in dezelfde orde van grootte en scores daarmee gunstig. Het VKA scoort hier met + / ++ tussen in (ten opzichte van de autonome situatie waarin nul ton uitstoot wordt vermeden).

4.4. Slagschaduw

De slagschaduw is bepaald voor de woningen welke binnen twaalf maal de rotordiameter van een windturbine gelegen zijn. Voor alle alternatieven is dit de bedrijfswoning van restaurant Grevelingen en voor een aantal de bedrijfswoning van restaurant Meerzicht. Voor de alternatieven 'Dubbele en Grote wolk' en het VKA zijn verder ook de drie woningen ter plaatse van de 'Eendenkooi' gelegen binnen de afstand van twaalf maal de rotordiameter.

Ter informatie is ook voor een aantal woningen buiten deze afstanden berekeningen uitgevoerd. Uit de resultaten is gebleken dat alleen voor de bedrijfswoning van restaurant Grevelingen sprake is van slagschaduw. Voor alle varianten geldt dat de overige woningen in de omgeving geen onaanvaardbare hinder ondervinden van slagschaduw. In bijlage III zijn deze overige woningen terug te vinden als receptorpunten A tot en met O.

Bij de bepaling is van belang de situering en afmetingen van ramen van de betreffende woningen. Binnen dit onderzoek heeft geen veldinventarisatie plaatsgevonden. In de berekeningen wordt uitgegaan van een 'kas', waarbij het raam altijd op de turbines gericht is.

Op basis van statistieken als windrichting, snelheid en zonuren is een schatting te maken van het aantal schaduwuren. Deze statistieken zijn verkregen van het KNMI, waarbij het gemiddelde is genomen van de stations Vlissingen en De Bilt.

De resultaten per variant staan weergegeven in onderstaande twee tabellen en in bijlage III. Tabel 4.4 betreft de bedrijfswoning van Restaurant Grevelingen (receptorpunt E). Tabel 4.5 betreft de bedrijfswoning van restaurant Meerzicht Receptorpunt U). De precieze ligging van de twee receptorpunten is opgenomen op kaart 1 in bijlage III.

Tabel 4.4. Slagschaduw ter plaatse van de bedrijfswoning restaurant Grevelingen

alternatief	worst case				real-case
	schaduw-uren per jaar u:min	aantal schaduw-dagen per jaar	maximaal schaduwuren per dag u:min	aantal dagen met meer dan 20 minuten schaduw	schaduwuren per jaar* u:min
enkele lijn	31:29	94	0:38	45	6:35 / 6:00 / 0:35
dubbele lijn	42:34	141	0:43	45	8:33/ 6:00 / 2:33
dubbele wolk	58:28	113	0:55	71	14:11/ 6:00 / 8:11
grote wolk	333:28	329	1:48	289	59:49/ 6:00 / 53:49
wolk	0	0	0	0	0 / 6:00 / 0
VKA	34:35	83	0:35	60	8:40 / 6:00 / 2:40

* Berekende waarde/norm/overschrijding.

Uit de tabel blijkt dat ter plaatse van de bedrijfswoning van restaurant Grevelingen bij vijf van de zes alternatieven gemiddeld meer dan zes uren sprake is van slagschaduw en dat een aantal turbines met een stilstandvoorziening uitgerust moet worden. Dit is per turbine en per opstelling opgenomen in bijlage III. Bij de variant Wolk treedt geen slagschaduw op. Dit wordt verklaard door de richting van de turbines ten opzichte van de woningen en de afstand van minimaal 1.200 m.

Tabel 4.5. Slagschaduw ter plaatse van de bedrijfswoning restaurant Meerzicht

alternatief	worst case				real-case
	schaduw-uren per jaar u:min	aantal schaduw-dagen per jaar	maximaal schaduwuren per dag u:min	aantal dagen met meer dan 20 minuten schaduw	schaduwuren per jaar* u:min
enkele lijn	18:13	52	0:37	30	3:37 / 6:00 / 0
dubbele lijn	0:33	10	0:04	0	0:07/ 6:00 / 0
dubbele wolk	6:37	39	0:21	1	1:16/ 6:00 / 0
grote wolk	29:49	113	0:34	28	5:08/ 6:00 / 0
wolk	0	0	0	0	0 / 6:00 / 0
VKA	3:33	21	0:16	0	0:40 / 6:00 / 0

* Berekende waarde / norm / overschrijding.

Uit de tabel blijkt dat ter plaatse van de bedrijfswoning van restaurant Meerzicht in geen van de alternatieven meer dan zes uur slagschaduw te verwachten is. Een stilstandvoorziening is derhalve niet noodzakelijk.

Met name bij de opstelling 'grote wolk' treedt slagschaduw op; bij de 'enkele lijn' en 'dubbele lijn' is de slagschaduw duidelijk minder. De slagschaduw treedt in alle alternatieven alleen op bij de bedrijfswoning van restaurant Grevelingen. In onderstaande tabel is het verlies aan energieopbrengst door stilstandvoorziening samengevat. Voor de dubbele lijn geldt (als voorbeeld) dat er maximaal 42,34 uur slagschaduw optreedt tegen een maximaal vermogen van 3 MW. Het maximale verlies bedraagt dan 127,7 MWh, wat overeenkomt met 0,04 % van het totaal van 315.809 MWh.

Tabel 4.6. Verloren energieopbrengst door stilstandvoorziening

alternatief	parkopbrengst zonder stilstand MWh/jaar	verloren energie door stilstandvoorziening in MWh/jaar	opbrengstverlies als percentage van totaal
enkele lijn	339.255	189 ^{a)}	0,06
dubbele lijn	330.563	128	0,04
dubbele wolk	363.824	175	0,05
grote wolk	551.499	1.000 ^{b)}	0,18
wolk	298.096	0	0
VKA	411.911	104	0,03

a) Relatief hoog omdat in deze opstelling 6 MW turbines worden stilgezet.

b) Relatief hoog omdat veel stilstand nodig is wegens het grote aantal schaduwen.

Uit de tabel blijkt dat het verlies voor het park als gevolg van slagschaduw, op basis van een worst case benadering, in alle alternatieven minder dan 0,2 % van de jaaropbrengst bedraagt. Slagschaduw is daarom geen onderscheidend criterium tussen de alternatieven.

Ter informatie is ook de optredende slagschaduw bepaald ter plaatse van de overnachtingsplaatsen voor beroepsvaart (receptorpunten 31 tot en met 34 op kaart in bijlage I). De resultaten zijn opgenomen in onderstaande tabel. Van de overnachtingsplaatsen worden de resultaten getoond voor de plaats waar de meeste schaduwen per jaar verwacht worden.

Tabel 4.7. Slagschaduw ter plaatse van overnachtingsplaatsen beroepsvaart

alternatief	worst case			verwacht
	schaduwen per jaar	schaduwdagen per jaar	maximaal schaduwuren per dag	schaduwen per jaar
enkele lijn	503:19	223	4:18	113:02
dubbele lijn	503:48	224	4:18	113:04
dubbele wolk	715:36	278	4:59	160:18
grote wolk	661:58	267	4:16	170:38
wolk	715:36	278	4:59	160:18
VKA	648:34	279	4:13	166:39

Uit de tabel blijkt dat er regelmatig slagschaduw optreedt bij de verschillende overnachtingsplaatsen. Dit is te verklaren door de ligging midden in het windpark. Slagschaduw treedt relatief gezien het meest op rond de winterperiode (als er relatief weinig recreatievaart is). Dit wordt veroorzaakt doordat de zon dan laag staat, waardoor de schaduwen een groter oppervlak beslaan.

4.5. Geluid

De geluidsniveaus ten gevolge van de windturbines zijn bepaald ter plaatse van de bedrijfswoning van het restaurant en een aantal woningen op Sint Phillipsland en Goeree-Overflakkee.

Vanwege de ligging van het beoogde windpark tussen drie Natura 2000-gebieden is het van belang om voor de verschillende alternatieven de geluidscontouren te bepalen in de omgeving van het plangebied. Voor de contouren wordt verwezen naar bijlage V. De berekeningslocaties van de overnachtingsplaatsen voor de binnenvaart zijn opgenomen in bijlage IV.

De resultaten van de akoestische berekeningen zijn opgenomen in onderstaande tabel en in bijlage IV. In de bijlage is ook de ligging van de ontvangstpunten weergegeven.

Tabel 4.8. Geluidniveaus bij receptorpunten als gevolg van windturbines

punt	omschrijving	Lden in dB *					VKA
		e lijn	d lijn	d wolk	g wolk	wolk	
01	woning Sluisweg	37/47/-	37/47/-	39/47/-	41/47/-	39/47/-	40/47/-
02	woning Battenoordseweg	37/47/-	36/47/-	37/47/-	40/47/-	34/47/-	37/47/-
03	woning Blaakweg	38/47/-	37/47/-	39/47/-	41/47/-	36/47/-	38/47/-
04	woning Oudelandsedijk	39/47/-	38/47/-	39/47/-	41/47/-	37/47/-	39/47/-
05	woning Noordweg	37/47/-	38/47/-	39/47/-	41/47/-	39/47/-	40/47/-
06	woning Langeweg	39/47/-	40/47/-	40/47/-	42/47/-	40/47/-	42/47/-
07	woning Hogeweg	40/47/-	41/47/-	40/47/-	42/47/-	40/47/-	42/47/-
08	bedrijfswoning Grevelingen	52/47/5	50/47/3	50/47/3	54/47/7	44/47/-	50/47/3
09	woning Eendenkooi	40/47/-	40/47/-	43/47/-	44/47/-	43/47/-	44/47/-
10	woning Eendenkooi	40/47/-	40/47/-	42/47/-	44/47/-	42/47/-	44/47/-
11	woning Eendenkooi	40/47/-	40/47/-	42/47/-	44/47/-	42/47/-	44/47/-
12	woning Hogeweg	40/47/-	41/47/-	40/47/-	42/47/-	40/47/-	41/47/-
13	woning Scharreweg	40/47/-	41/47/-	39/47/-	40/47/-	39/47/-	40/47/-
14	woning Zuiddijk	38/47/-	38/47/-	39/47/-	40/47/-	38/47/-	39/47/-
15	woning Suisenweg	38/47/-	38/47/-	39/47/-	40/47/-	38/47/-	39/47/-
16	bedrijfswoning Meerzicht	45/47/-	41/47/-	43/47/-	46/47/-	38/47/-	41/47/-
17	woning Oude Tonge	38/47/-	38/47/-	38/47/-	40/47/-	36/47/-	38/47/-
18	woning Oude Tonge	38/47/-	37/47/-	38/47/-	41/47/-	36/47/-	38/47/-
19	woning Oude Tonge	38/47/-	37/47/-	38/47/-	40/47/-	36/47/-	38/47/-
20	woning Oude Tonge	38/47/-	37/47/-	38/47/-	41/47/-	36/47/-	38/47/-
21	woning Oude Tonge	39/47/-	39/47/-	40/47/-	41/47/-	38/47/-	39/47/-
31	overnachtingsplaatsen	58	58	59	58	59	58
32	overnachtingsplaatsen	59	59	58	58	58	58
33	overnachtingsplaatsen	60	60	59	58	59	58
34	overnachtingsplaatsen	59	58	60	58	60	58
35	MZI-, oester- en mosselperceel	48	48	53	53	53	52
36	MZI-, oester- en mosselperceel	51	51	58	57	58	56
37	MZI-, oester- en mosselperceel	51	52	56	56	56	55
38	MZI-, oester- en mosselperceel	51	54	56	55	56	55
39	MZI-, oester- en mosselperceel	51	57	56	56	56	56
40	MZI-, oester- en mosselperceel	52	56	57	56	56	55
41	MZI-, oester- en mosselperceel	51	56	55	54	55	54
42	MZI-, oester- en mosselperceel	44	43	45	48	44	45
43	MZI-, oester- en mosselperceel	53	53	60	58	60	58
44	MZI-, oester- en mosselperceel	57	57	58	58	58	57
45	MZI-, oester- en mosselperceel	58	58	62	60	62	59
46	MZI-, oester- en mosselperceel	58	59	62	60	62	59
47	MZI-, oester- en mosselperceel	57	59	59	59	58	57
48	MZI-, oester- en mosselperceel	57	58	55	58	54	52
49	MZI-, oester- en mosselperceel	58	57	55	58	49	53
50	MZI-, oester- en mosselperceel	58	58	59	58	45	56
51	MZI-, oester- en mosselperceel	55	56	56	58	47	52
52	MZI-, oester- en mosselperceel	52	49	51	55	46	48
53	MZI-, oester- en mosselperceel	49	46	48	52	45	47
54	MZI-, oester- en mosselperceel	46	44	45	49	44	45
55	MZI-, oester- en mosselperceel	43	41	43	46	42	43

punt	omschrijving	Lden in dB *					
56	terras restaurant Grevelingen	53	51	51	56	47	50
57	werkplaats binnenhaven	57	54	56	57	45	54

* Berekende waarde/norm/overschrijding.

Uit de tabel blijkt dat bij de eerste vier alternatieven en het VKA ter plaatse van de bedrijfswoning (receptorpunt 08) niet wordt voldaan aan de norm van 47 dB. Ter plaatse van alle andere woningen wordt ruim voldaan aan de norm.

In de variant Wolk wordt ter plaatse van alle woningen voldaan.

Aangezien de overnachtingsplaatsen voor beroepsvaart (receptorpunten 21-24), de MZI-, oester- en mosselpercelen (25-45), het terras (56) en de werkhaven (57) geen geluid-gevoelige objecten zijn, is hierop geen geluidnorm van toepassing. Toetsing is daarom niet aan de orde, en deze objecten zijn in het vervolg dan ook buiten beschouwing gelaten.

Om ervoor te zorgen dat bij de bedrijfswoning alsnog aan de geluidnorm wordt voldaan, kunnen maatregelen getroffen worden. Deze bestaan bijvoorbeeld uit het stiller uitvoeren van een turbine. Hierop wordt in de volgende paragraaf nader ingegaan. Daarnaast kan gekozen worden voor het opstellen van maatwerkvoorschriften, waarbij door het bevoegd gezag een afweging gemaakt moet worden of mogelijk hogere normen vastgesteld kunnen worden.

De geluidcontouren (ecologie) zijn weergegeven in bijlage V.

4.6. Mogelijke reducerende maatregelen

Indien de voorkeur niet uitgaat naar het opstellen van maatwerkvoorschriften zijn geluidreducerende maatregelen mogelijk.

Voor de Siemens is een reductie van maximaal 5 dB per turbine haalbaar. Het stiller uitvoeren heeft echter zijn weerslag op het vermogen van een turbine. Het 5 dB stiller uitvoeren van de Siemens leidt tot een afname van 21 % energieopbrengst per turbine. Voor de REpower zijn geen gedetailleerde gegevens bekend over geluidreducerende pakketten. Gerekend wordt met dezelfde procentuele afname als de Siemens. Door het relatief hogere vermogen van de REpower ten opzichte van de Siemens turbines, heeft een geluidreducerende ingreep voor REpower een groter effect op de opbrengst van het park.

De invloed van het stiller maken van een aantal turbines op de opbrengsten van het windpark is weergegeven in onderstaande tabel. Het alternatief Wolk is hierin niet opgenomen, aangezien deze geen voorziening nodig heeft.

Tabel 4.9. Rendementsverlies windpark door stiller uitvoeren turbines

alternatief	opbrengst zonder maatregelen (MWh/jaar)*	maatregel #	opbrengst na maatregelen (MWh/jaar)	score	percentage verlies
enkele lijn	339.255	5 REpower -21 % turbines 18 t/m 20 + turbine 18's nachts stilstand	323.590	o/-	4,6 %
dubbele lijn	330.563	3 turbines -21 % turbine 2,4 & 5	328.685	o	0,6 %
dubbele wolk	363.824	2 turbines -21 % turbines 35 & 36 + 's nachts stilstand	354.660	o	2,5 %
grote wolk	551.499	turbines 1 t/m 11, 13, 15, 16, 19, 21, 25 & 33 t/m 50 -21 % + turbines 35, 41 & 42 's nachts stilstand	461.204	--	16,4 %
VKA	411.911	turbines 1 t/m 4 -21%	409.504	o	0,6 %

* Zonder verlies door stilstandvoorziening.

Voor situering turbines zie bijlagen.

Een uitschieter in verlies is de 'grote wolk', doordat aan veel turbines een maatregel wordt getroffen. Verder blijkt uit de tabel blijkt dat bij de opstelling 'enkele lijn' een rendementsverlies van 4,6 % optreedt. Het rendementsverlies bij de overige alternatieven is minder dan 1,0 %.

Na het stiller maken van de genoemde turbines wordt in elk alternatief voldaan aan de norm van 47 dB Lden.

4.7. Vergelijking met de referentiesituatie

Voor vergelijking met de referentiesituatie is de gecumuleerde geluidbelasting van de nabijgelegen wegen N59 en N257 en de scheepvaart op de maatgevende bedrijfswoning weergegeven in onderstaande tabel.

Tabel 4.10. Cumulatieve geluidbelasting op (maatgevende) bedrijfswoning restaurant Grevelingen

alternatief	Lden wegverkeer	Lden scheepvaart	Lden wegverkeer+scheepvaart	Lden turbines	Lden cumulatief
referentie	53,2	36,9	53,3	--	53
enkele lijn	53,2	36,9	53,3	52,0	56
dubbele lijn	53,2	36,9	53,3	49,5	54
dubbele wolk	53,2	36,9	53,3	50,5	55
grote wolk	53,2	36,9	53,3	54,3	56
wolk	53,2	36,9	53,3	44,5	54
VKA	53,2	36,9	53,3	50,0	54

Uit de tabel blijkt dat de gecumuleerde geluidbelasting op de bedrijfswoning als gevolg van de realisatie van de turbines toeneemt met 1 tot 3 dB. Dit is een met het menselijk oor net hoorbaar verschil. Dit kan een argument zijn voor het stellen van maatwerkvoorschriften.

5. SAMENVATTING EN CONCLUSIES

Het **rendement** van de parkalternatieven varieert tussen circa 76 % en 88 %. Een hoger rendement is haalbaar wanneer de onderlinge afstand toeneemt. Deze bedraagt nu 2,6 tot 4,3 maal de rotordiameter, daar waar tot 3 tot 6 maal geadviseerd wordt, afhankelijk van fabrikant en opstelling. De opstelling 'enkele lijn' scoort met 88 % duidelijk beter dan de overige alternatieven, terwijl de opstelling 'grote wolk' met 75 % parkrendement het meest ongunstig van alle opstellingen scoort. Het VKA zit hier met 80 % tussen in.

Slagschaduw treedt in alle alternatieven op, maar leidt alleen ter plaatse van de bedrijfswoning van restaurant Grevelingen tot een overschrijding van de norm. Op basis van worst case wordt een stilstand van maximaal 333 uur verwacht bij alternatief grote wolk. Dit leidt tot een rendementsverlies van minder dan 0,2 %. Slagschaduw is daarmee van relatief weinig invloed op de opbrengst. Gezien de relatief lage verliezen in alle alternatieven is slagschaduw niet onderscheidend tussen de alternatieven onderling.

De totale **energieopbrengst** van het windpark is in de opstelling 'grote wolk' verreweg het grootst, gevolgd door het VKA. De overige alternatieven leveren duidelijk minder energie en scoren onderling ongeveer even goed.

De alternatieven Enkele lijn, Dubbele lijn, Dubbele wolk, Grote wolk en het VKA leiden tot een overschrijding van de normwaarde van 47 dB L_{den} bij de maatgevende bedrijfswoning. Bij het overschrijden van de normwaarde is het mogelijk om deze overschrijding middels **maatwerkvoorschriften** toe te staan. Hierbij dient het bevoegd gezag te onderbouwen waarom voor deze situatie een hoger geluidniveau wordt toegestaan. Dit is voor al deze alternatieven een optie. De variant Wolk leidt niet tot een overschrijding.

Indien voldaan moet worden aan de normwaarde zullen **geluidreducerende maatregelen** getroffen moeten worden. De overschrijding van de geluidnorm bij de 'Grote wolk' is dermate hoog dat aan veel turbines een maatregel noodzakelijk is. Bij de overige alternatieven kan wel aan de geluidnorm worden voldaan door het stiller uitvoeren van een kleiner aantal turbines. Dit leidt tot een verlies in jaaropbrengst van 4,6 % ('Enkele lijn') tot minder dan 1 % (overige opstellingen, inclusief het VKA).

In onderstaande tabel zijn de effectscores voor de alternatieven samengevat.

Tabel 5.1. Score effecten alternatieven geluid, slagschaduw, energie

alternatief	energie (rendement)	energie (opbrengst)	vermeden luchtemissies	geluid	slagschaduw
enkele lijn	+	+	+	o/-	o
dubbele lijn	o	+	+	o	o
dubbele wolk	o	+	+	o	o
grote wolk	-	++	++	--	o
wolk	o	+	+	o	o
VKA	o	+ / ++	+ / ++	o	o
-- zeer negatief - negatief o neutraal + positief ++ zeer positief					

BIJLAGE I OPSTELLING

Project:

Alternatief 1: Enkele lijn

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Van Twickelostraat 2

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+31 570 69 76 76

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Calculated:

14-11-2013 11:50/2.7.490

Witteveen+Bos

BASIS - Map

Calculation: Variant 1: Enkele lijn



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Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593

New WTG



Meteorological Data



Shadow receptor

Project:

Alternatief 2: Dubbele lijn

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BASIS - Map

Calculation: Variant 2: Dubbele lijn



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Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593

New WTG



Meteorological Data



Shadow receptor

Project:

Alternatief 3: Dubbele wolk

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Calculated:

14-11-2013 12:35/2.7.490

Witteveen+Bos

BASIS - Map

Calculation: Variant 3: Dubbele wolk



New WTG



Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593



Shadow receptor

Project:

Alternatief 4: Grote wolk

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Calculated:

14-11-2013 12:43/2.7.490

Witteveen+Bos

BASIS - Map

Calculation: Variant 4: Grote wolk



New WTG



Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593

Shadow receptor

Project:

Alternatief 5: Wolk

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14-11-2013 13:57/2.7.490

Witteveen+Bos

BASIS - Map

Calculation: Variant 5



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Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593

New WTG

Meteorological Data

Shadow receptor

Project:

VKA

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Calculated:

14-11-2013 13:00/2.7.490

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BASIS - Map

Calculation: VKA



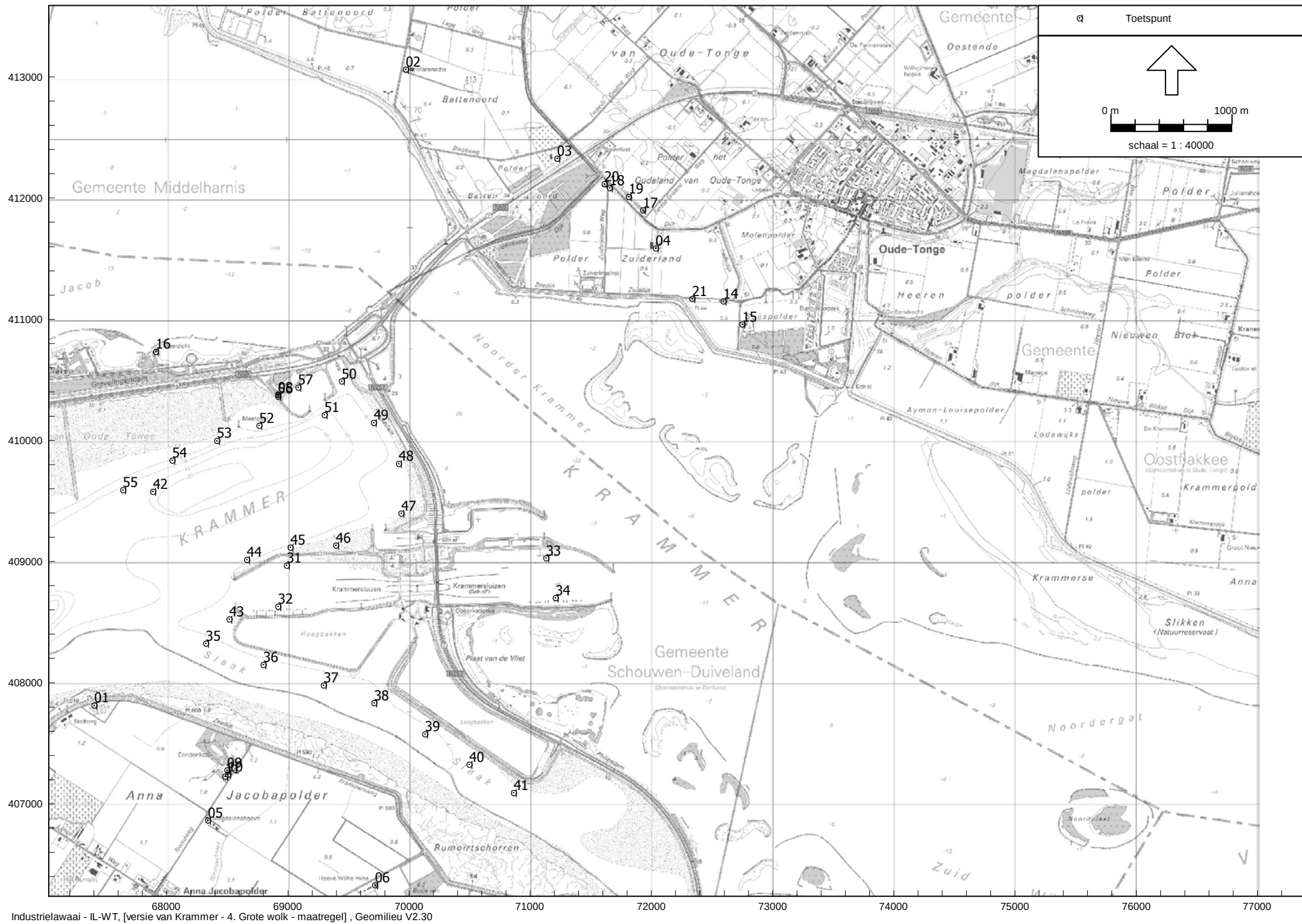
0 500 1000 1500 2000 m

Map: 100k, Print scale 1:40.000, Map center RD1 (NL) East: 69.968 North: 409.593

New WTG

Meteorological Data

Shadow receptor



Model: 1. Enkele lijn
Groep: (hoofdgroep)
Lijst van Rekenpunten, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Hoogte A
01	woning Sluisweg	67402,22	407813,21	5,00
02	woning Battenoordseweg	69973,54	413061,14	5,00
03	woning Blaakweg	71221,98	412325,34	5,00
04	woning Oudelandsedijk	72034,67	411586,42	5,00
05	woning Noordweg	68341,89	406863,88	5,00
06	woning Langeweg	69718,83	406328,59	5,00
07	woning Hogeweg	70421,42	406108,14	5,00
08	bedrijfswoning restaurant Grevelingen	68932,11	410373,22	5,00
09	woning Eendenkooi	68499,12	407277,04	5,00
10	woning Eendenkooi	68506,90	407242,02	5,00
11	woning Eendenkooi	68482,26	407225,16	5,00
31	overnachtingsplaatsen	68990,00	408967,00	5,00
32	overnachtingsplaatsen	68921,00	408627,00	5,00
33	overnachtingsplaatsen	71131,00	409027,00	5,00
34	overnachtingsplaatsen	71209,00	408699,00	5,00
12	woning Hogeweg	70470,10	406045,29	5,00
13	woning Scharreweg	71530,19	405917,11	5,00
14	woning Zuiddijk	72593,66	411146,83	5,00
15	woning Suisenweg	72750,73	410959,92	5,00
35	MZI-, oester- en mosselperceel	68324,05	408323,28	1,50
36	MZI-, oester- en mosselperceel	68800,18	408147,87	1,50
37	MZI-, oester- en mosselperceel	69296,35	407977,47	1,50
38	MZI-, oester- en mosselperceel	69712,33	407832,12	1,50
39	MZI-, oester- en mosselperceel	70133,33	407576,52	1,50
40	MZI-, oester- en mosselperceel	70499,19	407325,93	1,50
41	MZI-, oester- en mosselperceel	70865,06	407090,37	1,50
42	MZI-, oester- en mosselperceel	67888,02	409576,25	1,50
43	MZI-, oester- en mosselperceel	68517,72	408524,95	1,50
44	MZI-, oester- en mosselperceel	68662,65	409015,47	1,50
45	MZI-, oester- en mosselperceel	69023,11	409115,80	1,50
46	MZI-, oester- en mosselperceel	69398,44	409134,38	1,50
47	MZI-, oester- en mosselperceel	69937,27	409398,23	1,50
48	MZI-, oester- en mosselperceel	69914,97	409806,99	1,50
49	MZI-, oester- en mosselperceel	69710,59	410145,16	1,50
50	MZI-, oester- en mosselperceel	69446,75	410487,04	1,50
51	MZI-, oester- en mosselperceel	69301,82	410208,33	1,50
52	MZI-, oester- en mosselperceel	68762,99	410122,86	1,50
53	MZI-, oester- en mosselperceel	68417,39	409996,52	1,50
54	MZI-, oester- en mosselperceel	68045,78	409833,01	1,50
55	MZI-, oester- en mosselperceel	67640,73	409591,46	1,50
16	bedrijfswoning Meerzicht	67912,00	410730,00	5,00
17	woning Oude Tonge	71930,00	411900,00	5,00
18	woning Oude Tonge	71657,00	412081,00	5,00
19	woning Oude Tonge	71814,00	412013,00	5,00
20	woning Oude Tonge	71613,00	412117,00	5,00
21	woning Oude Tonge	72336,00	411169,00	5,00
56	terras restaurant Grevelingen	68952,12	410370,13	1,00
57	werkhaven	69087,78	410437,50	1,00

BIJLAGE II ENERGIE

Project:

Alternatief 1: Enkele lijn

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Calculated:

21-11-2013 12:34/2.7.490

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PARK - Main Result

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

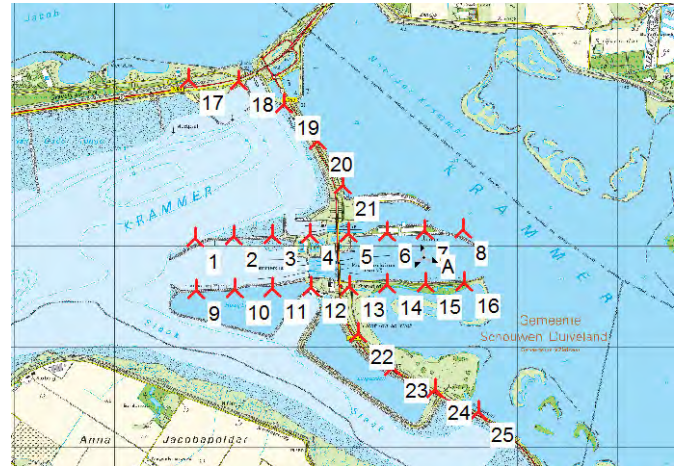
Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,231 kg/m³ to 1,236 kg/m³
 Air density relative to standard 100,5 %
 Hub altitude above sea level (asl) 79,5 m to 117,0 m
 Annual mean temperature at hub alt. 9,3 °C to 9,6 °C
 Pressure at WTGs 998,4 hPa to 1.003,0 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°]	Wind speed [m/s]
start end step	start end step
0,5 360,0 1,0	0,5 30,5 1,0



New WTG

Meteorological Data

Key results for height 50,0 m above ground level

Terrain RD1

East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m²]	Mean wind speed [m/s]
A 71.085	408.875	Default Meteo data description	10,0	WEIBULL	3.639	7,2

Calculated Annual Energy for Wind Farm

WTG combination	Result PARK [MWh/y]	Result-5,0% [MWh]	GROSS (no loss) Free WTGs [MWh/y]	Park efficiency [%]	Specific results ^{a)}			Mean wind speed @hub height [m/s]
					Capacity factor [%]	Mean WTG result [MWh/y]	Full load hours [Hours/year]	
Wind farm	357.110,6	339.255,1	404.638,0	88,3	37,9	13.570,2	3.326	8,4

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 25 new WTGs with total 102,0 MW rated power

WTG type				Power curve				Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator Name	Result	Result-5,0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]		[MWh]	[MWh]	[%]	[m/s]
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.879,8	10.336	91,3
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.165,0	9.657	85,3
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.815,2	9.324	82,4
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.600,8	9.121	80,6
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.487,7	9.013	79,6
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.499,8	9.025	79,7
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.598,9	9.119	80,6
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.963,4	9.465	83,6
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.943,5	10.396	91,9
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.461,8	9.939	87,8
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.233,3	9.722	85,9
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.069,2	9.566	84,5
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.798,1	9.308	82,2
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.480,8	9.007	79,6
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.731,0	9.244	81,7
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.109,3	9.604	84,9
17 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	22.784,8	21.646	95,8
18 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	22.243,3	21.131	93,5
19 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	21.918,8	20.823	92,2
20 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	21.329,0	20.263	89,7
21 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	20.504,5	19.479	86,2
22 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	21.691,9	20.607	91,2
23 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	21.992,7	20.893	92,5
24 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	22.209,1	21.099	93,4
25 A	Yes	REpower	6 M-6.000	6.000	126,0	117,0	USER	Level 0 - guaranteed - Onshore - 3/2007	22.598,9	21.469	95,0

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PARK - Main Result

WTG siting

RD1				
	East	North	Z	Row data/Description
	RD1		[m]	
1 New	68.816	409.067	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)
2 New	69.196	409.079	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)
3 New	69.575	409.090	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)
4 New	69.955	409.102	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)
5 New	70.335	409.113	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)
6 New	70.715	409.125	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)
7 New	71.095	409.137	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)
8 New	71.475	409.148	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)
9 New	68.821	408.544	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)
10 New	69.201	408.555	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)
11 New	69.581	408.567	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)
12 New	69.960	408.578	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)
13 New	70.340	408.590	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)
14 New	70.720	408.602	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)
15 New	71.100	408.613	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)
16 New	71.480	408.625	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)
17 New	68.746	410.646	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (59)
18 New	69.245	410.624	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (60)
19 New	69.689	410.394	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (61)
20 New	70.027	410.028	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (62)
21 New	70.273	409.590	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (63)
22 New	70.432	408.119	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (64)
23 New	70.775	407.783	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (65)
24 New	71.199	407.557	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (66)
25 New	71.630	407.346	0,0	REpower 6 M 6000 126.0 !O! hub: 117,0 m (67)

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PARK - Main Result

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

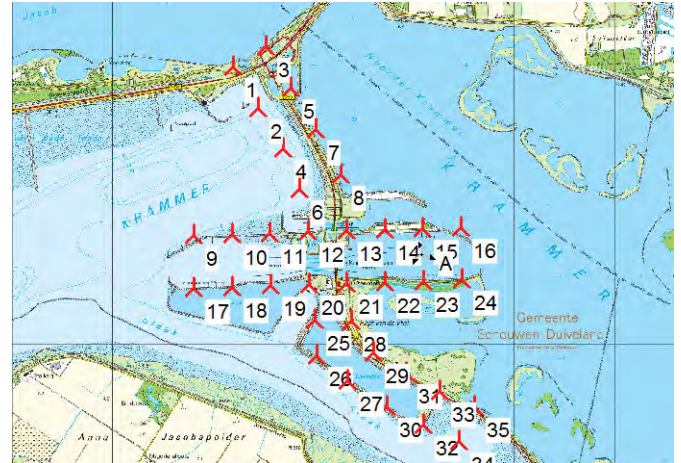
Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,236 kg/m³
 Air density relative to standard 100,9 %
 Hub altitude above sea level (asl) 79,5 m
 Annual mean temperature at hub alt. 9,6 °C
 Pressure at WTGs 1.003,0 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°] Wind speed [m/s]
 start end step start end step
 0,5 360,0 1,0 0,5 30,5 1,0



New WTG

Meteorological Data

Key results for height 80,0 m above ground level

Terrain RD1

	East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m²]	Mean wind speed [m/s]
A	71.085	408.875	Default Meteo data description	10,0	WEIBULL	4.821	8,1

Calculated Annual Energy for Wind Farm

WTG combination	Result		GROSS (no loss)	Park efficiency	Specific results ^{a)}		Full load hours	Mean wind speed @hub height
	PARK [MWh/y]	Result-5,0% [MWh]			Capacity factor [%]	Mean WTG result [MWh/y]		
Wind farm	347.961,2	330.563,1	416.994,6	83,4	35,9	9.444,7	3.148	8,1

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 35 new WTGs with total 105,0 MW rated power

WTG type	Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Power curve Creator	Name	Annual Energy		Park Efficiency	Mean wind speed
										Result	Result-5,0%		
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	11.061,3	10.508	92,8	8,12	
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.520,0	9.994	88,3	8,12	
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.732,6	10.196	90,1	8,12	
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.009,5	9.509	84,0	8,12	
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.215,0	9.704	85,7	8,12	
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.475,9	9.002	79,5	8,12	
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.849,9	9.357	82,7	8,12	
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.561,4	9.083	80,3	8,12	
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.842,4	10.300	91,0	8,12	
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.058,3	9.555	84,4	8,12	
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.609,0	9.129	80,7	8,12	
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.344,8	8.878	78,4	8,12	
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.130,3	8.674	76,6	8,12	
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.213,2	8.753	77,3	8,12	
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.401,4	8.931	78,9	8,12	
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.771,5	9.283	82,0	8,12	
17 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.893,2	10.349	91,4	8,12	
18 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.379,8	9.861	87,1	8,12	
19 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.046,5	9.544	84,3	8,12	
20 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.574,0	9.095	80,4	8,12	
21 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.907,2	8.462	74,8	8,12	
22 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.879,0	8.435	74,5	8,12	
23 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.374,5	8.906	78,7	8,12	
24 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.867,8	9.374	82,8	8,12	
25 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.803,4	9.313	82,3	8,12	
26 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.386,6	9.867	87,2	8,12	

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PARK - Main Result

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WTG type				Power curve						Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name		Result	Result-5,0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]				[MWh]	[MWh]	[%]	[m/s]
27 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.388,6	9.869	87,2	8,12
28 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.441,9	8.970	79,2	8,12
29 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.677,2	9.193	81,2	8,12
30 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.471,5	9.948	87,9	8,12
31 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.710,6	9.225	81,5	8,12
32 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.532,9	10.006	88,4	8,12
33 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.837,7	9.346	82,6	8,12
34 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.831,2	10.290	90,9	8,12
35 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.160,9	9.653	85,3	8,12

WTG siting

RD1

	East	North	Z	Row data/Description
	RD1		[m]	
1 New	69.204	410.744	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)
2 New	69.454	410.334	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)
3 New	69.530	410.943	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)
4 New	69.704	409.924	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)
5 New	69.778	410.532	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)
6 New	69.865	409.526	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)
7 New	70.028	410.122	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)
8 New	70.278	409.674	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)
9 New	68.816	409.067	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)
10 New	69.196	409.079	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)
11 New	69.575	409.090	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)
12 New	69.955	409.102	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)
13 New	70.335	409.113	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)
14 New	70.715	409.125	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)
15 New	71.095	409.137	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)
16 New	71.475	409.148	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)
17 New	68.821	408.544	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (59)
18 New	69.201	408.555	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (60)
19 New	69.581	408.567	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (61)
20 New	69.960	408.578	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (62)
21 New	70.340	408.590	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (63)
22 New	70.720	408.602	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (64)
23 New	71.100	408.613	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (65)
24 New	71.480	408.625	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (66)
25 New	70.017	408.225	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (67)
26 New	70.038	407.871	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (68)
27 New	70.342	407.624	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (69)
28 New	70.389	408.213	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (70)
29 New	70.609	407.904	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (71)
30 New	70.738	407.369	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (72)
31 New	70.929	407.698	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (73)
32 New	71.099	407.181	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (74)
33 New	71.266	407.523	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (75)
34 New	71.454	407.019	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (76)
35 New	71.612	407.365	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (77)

Project:

Alternatief 3: Dubbele wolk

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PARK - Main Result

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,236 kg/m³
 Air density relative to standard 100,9 %
 Hub altitude above sea level (asl) 79,5 m
 Annual mean temperature at hub alt. 9,6 °C
 Pressure at WTGs 1.003,0 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°] Wind speed [m/s]
 start end step start end step
 0,5 360,0 1,0 0,5 30,5 1,0



New WTG

Scale 1:75.000
Meteorological Data

Key results for height 80,0 m above ground level

Terrain RD1

	East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m²]	Mean wind speed [m/s]
A	71.085	408.875	Default Meteo data description	10,0	WEIBULL	4.821	8,1

Calculated Annual Energy for Wind Farm

WTG combination	Specific results ^{a)}							
	Result PARK	Result-5,0%	GROSS (no loss)	Park efficiency	Capacity factor	Mean WTG result	Full load hours	Mean wind speed @hub height
	[MWh/y]	[MWh]	Free WTGs [MWh/y]	[%]	[%]	[MWh/y]	[Hours/year]	[m/s]
Wind farm	382.973,6	363.824,9	464.651,1	82,4	35,5	9.328,8	3.110	8,1

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 39 new WTGs with total 117,0 MW rated power

WTG type							Power curve			Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Result	Result-5,0%	Efficiency	Mean wind speed	
				[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]	
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.684,2	10.150	89,7	8,12	
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.713,2	10.178	89,9	8,12	
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.441,2	9.919	87,6	8,12	
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.041,6	9.540	84,3	8,12	
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.585,2	9.106	80,5	8,12	
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.181,1	9.672	85,5	8,12	
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.574,9	9.096	80,4	8,12	
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.222,4	8.761	77,4	8,12	
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.785,7	9.296	82,1	8,12	
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.103,4	8.648	76,4	8,12	
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.875,2	8.431	74,5	8,12	
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.229,7	9.718	85,9	8,12	
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.120,2	8.664	76,5	8,12	
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.337,5	8.871	78,4	8,12	
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.808,9	9.318	82,3	8,12	
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.697,2	8.262	73,0	8,12	
17 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.300,3	9.785	86,5	8,12	
18 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.758,9	8.321	73,5	8,12	
19 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.125,6	8.669	76,6	8,12	
20 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.534,4	9.058	80,0	8,12	
21 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.876,4	8.433	74,5	8,12	
22 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.442,8	9.921	87,7	8,12	
23 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.776,2	9.287	82,1	8,12	
24 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.099,7	8.645	76,4	8,12	
25 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.196,8	8.737	77,2	8,12	
26 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.662,3	10.129	89,5	8,12	

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PARK - Main Result

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		WTG type						Power curve		Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name		Result	Result-5,0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]				[MWh]	[MWh]	[%]	[m/s]
27 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.353,9	8.886	78,5	8,12
28 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.061,5	9.558	84,5	8,12
29 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.552,5	9.075	80,2	8,12
30 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.711,6	9.226	81,5	8,12
31 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.622,1	10.091	89,2	8,12
32 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.106,5	9.601	84,8	8,12
33 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		11.036,4	10.485	92,6	8,12
34 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.486,8	9.962	88,0	8,12
35 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.387,3	9.868	87,2	8,12
36 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.003,7	9.503	84,0	8,12
37 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.307,2	9.792	86,5	8,12
38 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.116,1	9.610	84,9	8,12
39 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.053,0	9.550	84,4	8,12

WTG siting

RD1

	East	North	Z	Row data/Description
	RD1		[m]	
1 New	68.575	408.913	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (4)
2 New	68.595	408.494	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (5)
3 New	68.847	408.287	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (6)
4 New	68.976	409.097	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (7)
5 New	69.081	408.540	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (8)
6 New	69.234	408.191	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (9)
7 New	69.336	409.107	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (10)
8 New	69.477	408.591	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (11)
9 New	69.637	408.255	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (12)
10 New	69.691	409.119	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (13)
11 New	69.872	408.645	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (14)
12 New	69.959	407.914	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (15)
13 New	70.046	409.306	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (16)
14 New	70.054	408.332	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (17)
15 New	70.192	409.827	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (18)
16 New	70.286	409.001	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (19)
17 New	70.313	407.676	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (20)
18 New	70.325	408.623	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (21)
19 New	70.382	409.453	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (22)
20 New	70.431	408.118	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (23)
21 New	70.636	409.164	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (24)
22 New	70.660	407.432	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (25)
23 New	70.756	407.802	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (26)
24 New	70.757	408.637	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (27)
25 New	70.789	409.490	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (28)
26 New	71.046	407.251	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (29)
27 New	71.063	409.170	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (30)
28 New	71.129	407.642	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (31)
29 New	71.193	408.611	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (32)
30 New	71.416	409.103	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (33)
31 New	71.466	407.444	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (34)
32 New	71.626	408.658	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (35)
33 New	68.790	410.642	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (36)
34 New	69.150	410.760	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (37)
35 New	69.345	410.409	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (38)
36 New	69.520	410.863	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (39)
37 New	69.775	411.177	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (40)
38 New	69.818	410.414	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (41)
39 New	69.883	410.799	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (42)

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PARK - Main Result

Calculation: Variant 4: Grote wolk

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

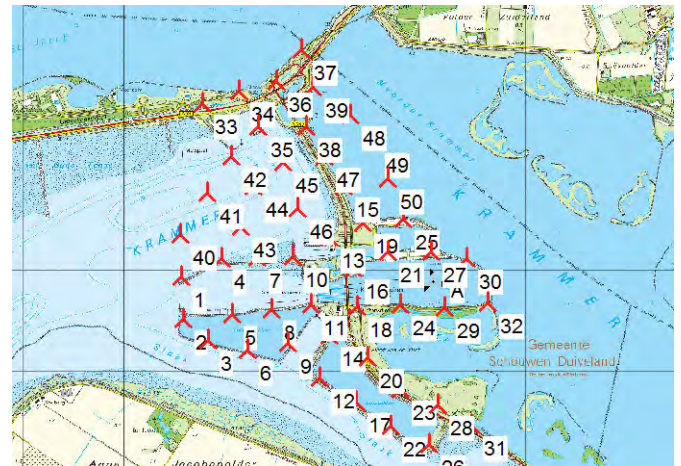
Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,231 kg/m³
 Air density relative to standard 100,5 %
 Hub altitude above sea level (asl) 122,5 m
 Annual mean temperature at hub alt. 9,3 °C
 Pressure at WTGs 997,8 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°] Wind speed [m/s]
 start end step start end step
 0,5 360,0 1,0 0,5 30,5 1,0



Key results for height 122,0 m above ground level

Terrain RD1

	East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m²]	Mean wind speed [m/s]
A	71.085	408.875	Default Meteo data description	10,0	WEIBULL	6.174	9,1

Calculated Annual Energy for Wind Farm

WTG combination	Result		GROSS (no loss)		Specific results ^{a)}		Full load		Mean wind speed	
	PARK [MWh/y]	Result-5,0% [MWh]	Free WTGs [MWh/y]	Park efficiency [%]	Capacity factor [%]	Mean WTG result [MWh/y]	hours [Hours/year]	Mean wind speed @hub height [m/s]		
Wind farm	580.526,1	551.499,7	769.065,2	75,5	41,9	11.030,0	3.677		9,1	

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 50 new WTGs with total 150,0 MW rated power

WTG type							Power curve		Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Result	Result-5,0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.668,5	12.035	82,4	9,09
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.140,1	12.483	85,4	9,09
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.817,5	12.177	83,3	9,09
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.483,6	10.909	74,7	9,09
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.430,8	10.859	74,3	9,09
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.514,7	11.889	81,4	9,09
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.800,9	10.261	70,2	9,09
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.004,2	10.454	71,5	9,09
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.942,0	11.345	77,6	9,09
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.257,3	9.744	66,7	9,09
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.532,3	10.006	68,5	9,09
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.646,4	12.014	82,2	9,09
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.209,3	9.699	66,4	9,09
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.309,3	10.744	73,5	9,09
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.391,4	9.872	67,6	9,09
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.217,8	9.707	66,4	9,09
17 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.802,5	12.162	83,2	9,09
18 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.490,2	9.966	68,2	9,09
19 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.204,4	9.694	66,3	9,09
20 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.724,7	11.139	76,2	9,09
21 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.437,6	9.916	67,9	9,09
22 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.050,3	12.398	84,8	9,09
23 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.161,7	11.554	79,1	9,09
24 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.072,4	10.519	72,0	9,09
25 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	10.825,7	10.284	70,4	9,09
26 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.468,1	12.795	87,6	9,09
27 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.451,7	10.879	74,5	9,09
28 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.656,2	12.023	82,3	9,09

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Calculated:

14-11-2013 12:45/2.7.490

Witteveen+Bos

PARK - Main Result

Calculation: Variant 4: Grote wolk

...continued from previous page

		WTG type		Power, rated	Rotor diameter	Hub height	Power curve		Annual Energy Result	Annual Energy Result-5,0%	Park Efficiency	Mean wind speed
Terrain	Valid	Manufact.	Type-generator				Creator	Name				
				[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]
29 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.831,0	11.239	76,9	9,09
30 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.128,5	11.522	78,9	9,09
31 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	13.579,2	12.900	88,3	9,09
32 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.781,5	12.142	83,1	9,09
33 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	13.460,4	12.787	87,5	9,09
34 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.454,0	11.831	81,0	9,09
35 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.315,4	10.750	73,6	9,09
36 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.736,0	11.149	76,3	9,09
37 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.452,7	11.830	81,0	9,09
38 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.586,9	10.058	68,8	9,09
39 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.660,1	11.077	75,8	9,09
40 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.865,4	12.222	83,6	9,09
41 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.002,4	11.402	78,0	9,09
42 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.481,1	10.907	74,6	9,09
43 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.703,9	10.169	69,6	9,09
44 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.724,5	10.188	69,7	9,09
45 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.324,4	9.808	67,1	9,09
46 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.430,7	9.909	67,8	9,09
47 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.559,4	10.031	68,7	9,09
48 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.366,5	10.798	73,9	9,09
49 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.398,2	10.828	74,1	9,09
50 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	10.972,0	10.423	71,3	9,09

WTG siting

RD1

	East	North	Z	Row data/Description
RD1			[m]	
1 New	68.575	408.913	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (98)
2 New	68.595	408.494	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (99)
3 New	68.847	408.287	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (100)
4 New	68.976	409.097	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (101)
5 New	69.081	408.540	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (102)
6 New	69.234	408.191	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (103)
7 New	69.336	409.107	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (104)
8 New	69.477	408.591	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (105)
9 New	69.637	408.255	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (106)
10 New	69.691	409.119	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (107)
11 New	69.872	408.645	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (108)
12 New	69.959	407.914	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (109)
13 New	70.046	409.306	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (110)
14 New	70.054	408.332	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (111)
15 New	70.192	409.818	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (112)
16 New	70.286	409.001	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (113)
17 New	70.313	407.676	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (114)
18 New	70.325	408.623	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (115)
19 New	70.382	409.453	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (116)
20 New	70.431	408.118	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (117)
21 New	70.637	409.164	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (118)
22 New	70.660	407.432	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (119)
23 New	70.756	407.802	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (120)
24 New	70.757	408.637	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (121)
25 New	70.789	409.490	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (122)
26 New	71.046	407.251	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (123)
27 New	71.063	409.170	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (124)
28 New	71.129	407.642	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (125)
29 New	71.193	408.611	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (126)
30 New	71.416	409.103	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (127)
31 New	71.466	407.444	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (128)
32 New	71.626	408.658	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (129)
33 New	68.790	410.642	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (130)
34 New	69.150	410.760	0,0	Siemens SWT-3.0-101 3000 113,0 !O! hub: 122,5 m (131)

To be continued on next page...

Project:

Alternatief 4: Grote wolk

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Van Twickelostraat 2

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Calculated:

14-11-2013 12:45/2.7.490

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PARK - Main Result

Calculation: Variant 4: Grote wolk

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RD1

	East	North	Z	Row data/Description
	RD1		[m]	
35 New	69.345	410.409	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (132)
36 New	69.520	410.863	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (133)
37 New	69.775	411.177	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (134)
38 New	69.818	410.414	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (135)
39 New	69.883	410.799	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (136)
40 New	68.572	409.334	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (137)
41 New	68.833	409.749	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (138)
42 New	69.070	410.110	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (139)
43 New	69.169	409.414	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (140)
44 New	69.296	409.812	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (141)
45 New	69.587	410.056	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (142)
46 New	69.731	409.599	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (143)
47 New	70.004	410.118	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (144)
48 New	70.256	410.527	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (145)
49 New	70.491	410.257	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (146)
50 New	70.630	409.895	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (147)

Project:

Alternatief 5: Wolk

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Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 10:50/2.7.490

Witteveen+Bos

PARK - Main Result

Calculation: Sluizencomplex

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

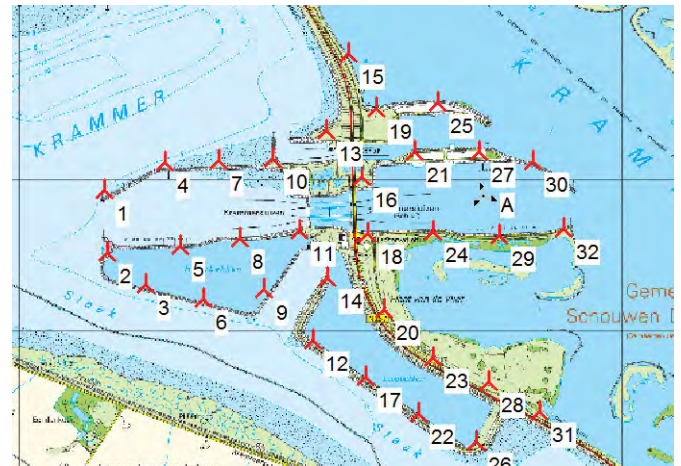
Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,236 kg/m³
 Air density relative to standard 100,9 %
 Hub altitude above sea level (asl) 79,5 m
 Annual mean temperature at hub alt. 9,6 °C
 Pressure at WTGs 1.003,0 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°] Wind speed [m/s]
 start end step start end step
 0,5 360,0 1,0 0,5 30,5 1,0



New WTG

Scale 1:50.000
Meteorological Data

Key results for height 80,0 m above ground level

Terrain RD1

	East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m ²]	Mean wind speed [m/s]
A	71.085	408.875	Default Meteo data description	10,0	WEIBULL	4.821	8,1

Calculated Annual Energy for Wind Farm

WTG combination	Result		GROSS (no loss)	Park efficiency	Specific results ^{a)}		Full load hours	Mean wind speed @hub height
	PARK [MWh/y]	Result-5,0% [MWh]			Capacity factor [%]	Mean WTG result [MWh/y]		
Wind farm	313.786,1	298.096,8	381.252,2	82,3	35,4	9.315,5	3.105	8,1

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 32 new WTGs with total 96,0 MW rated power

WTG type							Power curve			Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name	Result	Result-5,0%	Efficiency	Mean wind speed	
				[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]	
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.836,9	10.295	91,0	8,12	
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.791,8	10.252	90,6	8,12	
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.517,2	9.991	88,3	8,12	
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.250,1	9.738	86,0	8,12	
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.683,3	9.199	81,3	8,12	
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.254,9	9.742	86,1	8,12	
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.795,7	9.306	82,2	8,12	
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.334,8	8.868	78,4	8,12	
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.856,2	9.363	82,7	8,12	
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.323,9	8.858	78,3	8,12	
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.982,6	8.533	75,4	8,12	
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.274,9	9.761	86,2	8,12	
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.351,9	8.884	78,5	8,12	
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.398,4	8.929	78,9	8,12	
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.155,5	9.648	85,2	8,12	
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.812,1	8.371	74,0	8,12	
17 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.331,4	9.815	86,7	8,12	
18 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.829,0	8.388	74,1	8,12	
19 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.291,0	8.826	78,0	8,12	
20 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.582,7	9.104	80,4	8,12	
21 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	8.982,7	8.534	75,4	8,12	
22 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.467,7	9.944	87,9	8,12	
23 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.812,2	9.322	82,4	8,12	
24 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.162,2	8.704	76,9	8,12	
25 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	9.338,2	8.871	78,4	8,12	
26 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013	10.685,6	10.151	89,7	8,12	

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Project:

Alternatief 5: Wolk

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Calculated:

21-11-2013 10:50/2.7.490

Witteveen+Bos

PARK - Main Result

Calculation: Sluizencomplex

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		WTG type						Power curve		Annual Energy		Park	
Terrain	Valid	Manufact.	Type-generator	Power, rated	Rotor diameter	Hub height	Creator	Name		Result	Result-5,0%	Efficiency	Mean wind speed
				[kW]	[m]	[m]				[MWh]	[MWh]	[%]	[m/s]
27 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.418,9	8.948	79,1	8,12
28 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.092,7	9.588	84,7	8,12
29 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.599,9	9.120	80,6	8,12
30 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		9.780,9	9.292	82,1	8,12
31 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.648,4	10.116	89,4	8,12
32 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	EMD	Level 0 - Calculated - Std. 107 dB - 02-2013		10.142,7	9.636	85,1	8,12

WTG siting**RD1**

	East	North	Z	Row data/Description
	RD1		[m]	
1 New	68.575	408.913	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (98)
2 New	68.595	408.494	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (99)
3 New	68.847	408.287	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (100)
4 New	68.976	409.097	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (101)
5 New	69.081	408.540	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (102)
6 New	69.234	408.191	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (103)
7 New	69.336	409.107	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (104)
8 New	69.477	408.591	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (105)
9 New	69.637	408.255	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (106)
10 New	69.691	409.119	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (107)
11 New	69.872	408.645	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (108)
12 New	69.959	407.914	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (109)
13 New	70.046	409.306	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (110)
14 New	70.054	408.332	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (111)
15 New	70.192	409.818	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (112)
16 New	70.286	409.001	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (113)
17 New	70.313	407.676	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (114)
18 New	70.325	408.623	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (115)
19 New	70.382	409.453	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (116)
20 New	70.431	408.118	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (117)
21 New	70.637	409.164	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (118)
22 New	70.660	407.432	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (119)
23 New	70.756	407.802	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (120)
24 New	70.757	408.637	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (121)
25 New	70.789	409.490	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (122)
26 New	71.046	407.251	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (123)
27 New	71.063	409.170	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (124)
28 New	71.129	407.642	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (125)
29 New	71.193	408.611	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (126)
30 New	71.416	409.103	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (127)
31 New	71.466	407.444	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (128)
32 New	71.626	408.658	0,0	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (129)

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PARK - Main Result

Wake Model

N.O. Jensen (RISØ/EMD)

Calculation Settings

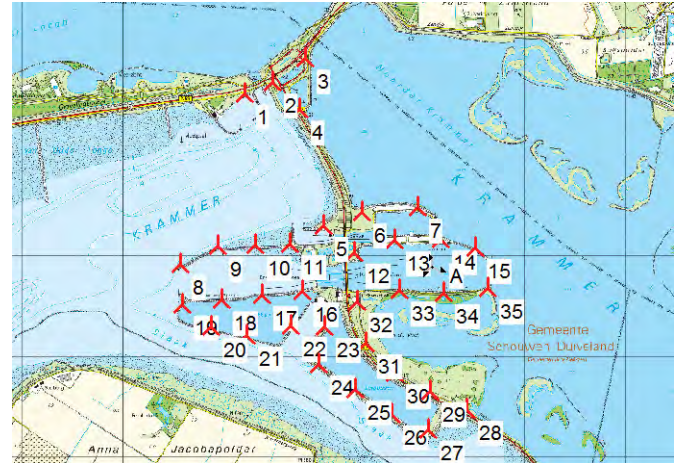
Air density calculation mode Individual per WTG
 Result for WTG at hub altitude 1,231 kg/m³
 Air density relative to standard 100,5 %
 Hub altitude above sea level (asl) 122,5 m
 Annual mean temperature at hub alt. 9,3 °C
 Pressure at WTGs 997,8 hPa

Wake Model Parameters

Wake Decay Constant 0,040 Offshore & Water areas

Wake calculation settings

Angle [°] Wind speed [m/s]
 start end step start end step
 0,5 360,0 1,0 0,5 30,5 1,0



Scale 1:75.000

New WTG

Meteorological Data

Key results for height 50,0 m above ground level

Terrain RD1

	East	North	Name of wind distribution	Height [m]	Type	Wind energy [kWh/m²]	Mean wind speed [m/s]
A	71.085	408.875	Default Meteo data description	10,0	WEIBULL	3.639	7,2

Calculated Annual Energy for Wind Farm

WTG combination	Result		GROSS (no loss)	Park efficiency	Specific results ^{a)}		Full load hours	Mean wind speed @hub height
	PARK [MWh/y]	Result-5,0% [MWh]			Capacity factor [%]	Mean WTG result [MWh/y]		
Wind farm	433.591,2	411.911,6	538.345,6	80,5	44,8	11.768,9	3.923	9,1

^{a)} Based on Result-5,0%

Calculated Annual Energy for each of 35 new WTGs with total 105,0 MW rated power

Terrain	WTG type		Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Power curve		Annual Energy		Park Efficiency [%]	Mean wind speed [m/s]
	Valid	Manufact.					Creator	Name	Result [MWh]	Result-5,0% [MWh]		
1 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.720,7	13.035	89,2	9,09
2 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.240,7	12.579	86,1	9,09
3 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.518,4	12.842	87,9	9,09
4 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.360,6	12.693	86,9	9,09
5 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.653,8	11.071	75,8	9,09
6 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.913,2	11.318	77,5	9,09
7 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.988,8	11.389	77,9	9,09
8 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.446,5	12.774	87,4	9,09
9 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.699,8	12.065	82,6	9,09
10 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.989,6	11.390	77,9	9,09
11 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.419,9	10.849	74,2	9,09
12 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.120,8	10.565	72,3	9,09
13 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.355,6	10.788	73,8	9,09
14 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.936,3	11.340	77,6	9,09
15 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.461,9	11.839	81,0	9,09
16 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.026,6	10.475	71,7	9,09
17 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.561,9	10.984	75,2	9,09
18 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.745,9	11.159	76,4	9,09
19 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.488,3	12.814	87,7	9,09
20 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.037,6	12.386	84,8	9,09
21 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.768,1	12.130	83,0	9,09
22 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.027,7	11.426	78,2	9,09
23 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	11.735,2	11.148	76,3	9,09
24 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.723,7	12.088	82,7	9,09
25 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	12.919,1	12.273	84,0	9,09
26 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.105,9	12.451	85,2	9,09
27 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.482,8	12.809	87,7	9,09
28 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting OdB - 03-2010	13.600,8	12.921	88,4	9,09

To be continued on next page...

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PARK - Main Result

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		WTG type		Power, rated	Rotor diameter	Hub height	Power curve		Annual Energy Result	Annual Energy Result-5,0%	Park	
Terrain	Valid	Manufact.	Type-generator				Creator	Name			Efficiency	Mean wind speed
				[kW]	[m]	[m]			[MWh]	[MWh]	[%]	[m/s]
29 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.725,9	12.090	82,7	9,09
30 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.354,0	11.736	80,3	9,09
31 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.017,0	11.416	78,1	9,09
32 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.166,7	10.608	72,6	9,09
33 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	11.293,9	10.729	73,4	9,09
34 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.051,5	11.449	78,4	9,09
35 A	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	USER	Level 0 - Calculated - Standard setting 0dB - 03-2010	12.931,7	12.285	84,1	9,09

WTG siting

RD1

	East	North	Z	Row data/Description
	RD1		[m]	
1 New	69.225	410.594	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (81)
2 New	69.496	410.706	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (82)
3 New	69.821	410.949	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (83)
4 New	69.769	410.442	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (84)
5 New	70.006	409.278	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (85)
6 New	70.389	409.415	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (86)
7 New	70.940	409.460	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (87)
8 New	68.586	408.901	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (88)
9 New	68.956	409.080	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (89)
10 New	69.324	409.092	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (90)
11 New	69.673	409.103	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (91)
12 New	70.312	409.014	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (92)
13 New	70.715	409.138	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (93)
14 New	71.172	409.153	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (94)
15 New	71.520	409.063	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (95)
16 New	69.794	408.636	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (96)
17 New	69.394	408.595	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (97)
18 New	68.995	408.541	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (98)
19 New	68.596	408.493	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (99)
20 New	68.889	408.277	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (100)
21 New	69.239	408.193	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (101)
22 New	69.677	408.291	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (102)
23 New	70.019	408.274	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (103)
24 New	69.957	407.909	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (104)
25 New	70.324	407.656	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (105)
26 New	70.688	407.406	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (106)
27 New	71.047	407.250	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (107)
28 New	71.432	407.452	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (108)
29 New	71.071	407.638	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (109)
30 New	70.717	407.822	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (110)
31 New	70.425	408.113	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (111)
32 New	70.337	408.523	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (112)
33 New	70.761	408.640	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (113)
34 New	71.201	408.614	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (114)
35 New	71.639	408.660	0,0	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (115)

BIJLAGE III SLAGSCHADUW

Project:

Alternatief 1: Enkele lijn

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SHADOW - Main Result

Calculation: Variant 1: Enkele lijn

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:100.000

New WTG

Shadow receptor

WTGs

RD1	RD1			Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
	East	North	Z		Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
RD1			[m]									
1	68.816	409.067	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	69.196	409.079	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	69.575	409.090	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	69.955	409.102	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	70.335	409.113	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	70.715	409.125	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	71.095	409.137	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	71.475	409.148	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	68.821	408.544	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.201	408.555	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.581	408.567	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.960	408.578	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.340	408.590	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.720	408.602	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	71.100	408.613	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	71.480	408.625	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	68.746	410.646	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
18	69.245	410.624	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
19	69.689	410.394	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
20	70.027	410.028	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
21	70.273	409.590	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
22	70.432	408.119	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
23	70.775	407.783	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
24	71.199	407.557	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
25	71.630	407.346	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1

Project:

Alternatief 1: Enkele lijn

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SHADOW - Main Result

Calculation: Variant 1: Enkele lijn

Shadow receptor-Input**RD1**

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
P	71.930	411.900	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
Q	71.657	412.081	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
R	71.613	412.117	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
S	71.814	412.013	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
T	72.336	411.169	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"
U	67.912	410.730	0,0	0,1	0,1	1,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
A	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
E	31:29	94	0:38	6:35	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
L	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	
S	0:00	0	0:00	0:00	
T	0:00	0	0:00	0:00	
U	18:13	52	0:37	3:37	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)	0:00	0:00
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)	0:00	0:00
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)	0:00	0:00
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)	0:00	0:00

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Project:

Alternatief 1: Enkele lijn

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SHADOW - Main Result

Calculation: Variant 1: Enkele lijn

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No.	Name	Worst case [h/year]	Expected [h/year]
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)	0:00	0:00
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)	0:00	0:00
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)	0:00	0:00
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)	0:00	0:00
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)	0:00	0:00
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)	0:00	0:00
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)	0:00	0:00
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)	0:00	0:00
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)	0:00	0:00
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)	0:00	0:00
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)	0:00	0:00
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)	0:00	0:00
17	REpower 6 M 6000 126.0 !O! hub: 117,0 m (59)	17:37	3:30
18	REpower 6 M 6000 126.0 !O! hub: 117,0 m (60)	3:50	0:43
19	REpower 6 M 6000 126.0 !O! hub: 117,0 m (61)	23:34	5:22
20	REpower 6 M 6000 126.0 !O! hub: 117,0 m (62)	6:28	1:02
21	REpower 6 M 6000 126.0 !O! hub: 117,0 m (63)	1:54	0:17
22	REpower 6 M 6000 126.0 !O! hub: 117,0 m (64)	0:00	0:00
23	REpower 6 M 6000 126.0 !O! hub: 117,0 m (65)	0:00	0:00
24	REpower 6 M 6000 126.0 !O! hub: 117,0 m (66)	0:00	0:00
25	REpower 6 M 6000 126.0 !O! hub: 117,0 m (67)	0:00	0:00

Project:

Alternatief 2: Dubbele lijn

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:100.000

New WTG

Shadow receptor

WTGs

RD1			Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
East	North	Z		Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
RD1		[m]									
1	69.204	410.744	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	69.454	410.334	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	69.530	410.943	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	69.704	409.924	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.778	410.532	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.865	409.526	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	70.028	410.122	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	70.278	409.674	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	68.816	409.067	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.196	409.079	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.575	409.090	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.955	409.102	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.335	409.113	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.715	409.125	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	71.095	409.137	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	71.475	409.148	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	68.821	408.544	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	69.201	408.555	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	69.581	408.567	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	69.960	408.578	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.340	408.590	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.720	408.602	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	71.100	408.613	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	71.480	408.625	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.017	408.225	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	70.038	407.871	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	70.342	407.624	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	70.389	408.213	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	70.609	407.904	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	70.738	407.369	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

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SHADOW - Main Result

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RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	70.929	407.698	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.099	407.181	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
33	71.266	407.523	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
34	71.454	407.019	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
35	71.612	407.365	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
P	71.930	411.900	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
Q	71.657	412.081	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
R	71.814	412.013	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
S	71.613	412.117	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
T	72.336	411.169	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
U	67.912	410.730	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
A	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
E	42:34	141	0:43	8:33	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
L	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	

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Project:

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SHADOW - Main Result

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Shadow, worst case			Shadow, expected values	
No.	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]
S	0:00	0	0:00	0:00
T	0:00	0	0:00	0:00
U	0:33	10	0:04	0:07

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)	0:31	0:06
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)	26:47	5:30
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)	0:00	0:00
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)	6:00	0:56
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)	7:07	1:43
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)	1:00	0:06
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)	1:35	0:16
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)	0:00	0:00
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)	0:00	0:00
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)	0:00	0:00
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)	0:00	0:00
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)	0:00	0:00
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)	0:00	0:00
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)	0:00	0:00
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)	0:00	0:00
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)	0:00	0:00
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (59)	0:00	0:00
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (60)	0:00	0:00
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (61)	0:00	0:00
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (62)	0:00	0:00
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (63)	0:00	0:00
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (64)	0:00	0:00
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (65)	0:00	0:00
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (66)	0:00	0:00
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (67)	0:00	0:00
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (68)	0:00	0:00
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (69)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (70)	0:00	0:00
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (71)	0:00	0:00
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (72)	0:00	0:00
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (73)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (74)	0:00	0:00
33	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (75)	0:00	0:00
34	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (76)	0:00	0:00
35	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (77)	0:00	0:00

Project:

Alternatief 3: Dubbele wolk

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Calculated:

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:100.000

New WTG

Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.691	409.119	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	70.192	409.827	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.636	409.164	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

To be continued on next page...

Project:

Alternatief 3: Dubbele wolk

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
33	68.790	410.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
34	69.150	410.760	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
35	69.345	410.409	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
36	69.520	410.863	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
37	69.775	411.177	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
38	69.818	410.414	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
39	69.883	410.799	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
P	71.930	411.900	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
Q	71.657	412.081	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
R	71.814	412.013	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
S	71.613	412.117	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
T	72.336	411.169	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
U	67.912	410.730	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	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	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
E	58:28	113	0:55	14:11	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
L	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	

To be continued on next page...

Project:

Alternatief 3: Dubbele wolk

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Calculated:

14-11-2013 12:36/2.7.490

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SHADOW - Main Result

...continued from previous page

Shadow, worst case			Shadow, expected values	
No.	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]
O	0:00	0	0:00	0:00
P	0:00	0	0:00	0:00
Q	0:00	0	0:00	0:00
R	0:00	0	0:00	0:00
S	0:00	0	0:00	0:00
T	0:00	0	0:00	0:00
U	6:37	39	0:21	1:16

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (4)	0:00	0:00
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (5)	0:00	0:00
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (6)	0:00	0:00
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (7)	0:00	0:00
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (8)	0:00	0:00
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (9)	0:00	0:00
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (10)	0:00	0:00
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (11)	0:00	0:00
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (12)	0:00	0:00
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (13)	0:00	0:00
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (14)	0:00	0:00
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (15)	0:00	0:00
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (16)	0:00	0:00
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (17)	0:00	0:00
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (18)	0:00	0:00
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (19)	0:00	0:00
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (20)	0:00	0:00
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (21)	0:00	0:00
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (22)	0:00	0:00
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (23)	0:00	0:00
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (24)	0:00	0:00
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (25)	0:00	0:00
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (26)	0:00	0:00
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (27)	0:00	0:00
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (28)	0:00	0:00
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (29)	0:00	0:00
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (30)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (31)	0:00	0:00
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (32)	0:00	0:00
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (33)	0:00	0:00
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (34)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (35)	0:00	0:00
33	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (36)	5:46	1:05
34	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (37)	0:49	0:10
35	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (38)	53:13	12:47
36	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (39)	0:00	0:00
37	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (40)	0:00	0:00
38	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (41)	5:39	1:15
39	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (42)	5:01	1:20

Project:

Alternatief 4: Grote wolk

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Calculated:

14-11-2013 12:49/2.7.490

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



New WTG

Scale 1:100.000

Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
10	69.691	408.119	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
15	70.192	409.818	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
21	70.637	409.164	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

To be continued on next page...

Project:

Alternatief 4: Grote wolk

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
33	68.790	410.642	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
34	69.150	410.760	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
35	69.345	410.409	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
36	69.520	410.863	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
37	69.775	411.177	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
38	69.818	410.414	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
39	69.883	410.799	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
40	68.572	409.334	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
41	68.833	409.749	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
42	69.070	410.110	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
43	69.169	409.414	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
44	69.296	409.812	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
45	69.587	410.056	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
46	69.731	409.599	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
47	70.004	410.118	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
48	70.256	410.527	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
49	70.491	410.257	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
50	70.630	409.895	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
P	71.930	411.900	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
Q	71.657	412.081	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
R	71.814	412.013	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
S	71.613	412.117	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
T	72.336	411.169	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
U	67.912	410.730	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	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	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	

To be continued on next page...

Project:

Alternatief 4: Grote wolk

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Van Twickelostraat 2

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SHADOW - Main Result

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No.	Shadow, worst case		Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]
E	333:28	329	1:48	59:49
F	0:00	0	0:00	0:00
G	0:00	0	0:00	0:00
H	0:00	0	0:00	0:00
I	0:00	0	0:00	0:00
J	0:00	0	0:00	0:00
K	0:00	0	0:00	0:00
L	0:00	0	0:00	0:00
M	0:00	0	0:00	0:00
N	0:00	0	0:00	0:00
O	0:00	0	0:00	0:00
P	0:00	0	0:00	0:00
Q	0:00	0	0:00	0:00
R	0:00	0	0:00	0:00
S	0:00	0	0:00	0:00
T	0:00	0	0:00	0:00
U	29:49	113	0:34	5:08

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (98)	0:00	0:00
2	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (99)	0:00	0:00
3	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (100)	0:00	0:00
4	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (101)	0:00	0:00
5	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (102)	0:00	0:00
6	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (103)	0:00	0:00
7	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (104)	0:00	0:00
8	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (105)	0:00	0:00
9	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (106)	0:00	0:00
10	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (107)	0:00	0:00
11	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (108)	0:00	0:00
12	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (109)	0:00	0:00
13	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (110)	0:00	0:00
14	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (111)	0:00	0:00
15	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (112)	0:00	0:00
16	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (113)	0:00	0:00
17	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (114)	0:00	0:00
18	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (115)	0:00	0:00
19	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (116)	0:00	0:00
20	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (117)	0:00	0:00
21	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (118)	0:00	0:00
22	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (119)	0:00	0:00
23	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (120)	0:00	0:00
24	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (121)	0:00	0:00
25	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (122)	0:00	0:00
26	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (123)	0:00	0:00
27	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (124)	0:00	0:00
28	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (125)	0:00	0:00
29	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (126)	0:00	0:00
30	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (127)	0:00	0:00
31	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (128)	0:00	0:00
32	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (129)	0:00	0:00
33	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (130)	13:12	2:39
34	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (131)	4:44	1:02
35	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (132)	83:14	21:00
36	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (133)	0:00	0:00
37	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (134)	0:00	0:00
38	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (135)	13:38	3:11

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Project:

Alternatief 4: Grote wolk

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SHADOW - Main Result

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
39	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (136)	20:12	5:10
40	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (137)	0:00	0:00
41	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (138)	19:21	2:01
42	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (139)	126:59	19:26
43	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (140)	0:00	0:00
44	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (141)	50:44	5:37
45	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (142)	20:43	3:34
46	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (143)	11:16	1:20
47	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (144)	6:37	1:11
48	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (145)	3:38	0:52
49	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (146)	0:00	0:00
50	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (147)	0:00	0:00

Project:

Alternatief 5: Wolk

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Calculated:

21-11-2013 10:53/2.7.490

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:100.000

★ New WTG

● Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.691	409.119	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	70.192	409.818	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.637	409.164	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

To be continued on next page...

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Calculated:

21-11-2013 10:53/2.7.490

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
P	71.930	411.900	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
Q	71.657	412.081	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
R	71.814	412.013	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
S	71.613	412.117	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
T	72.336	411.169	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
U	67.912	410.730	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

No.	Shadow, worst case			Shadow, expected values	
	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]	Shadow hours per year [h/year]	
A	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
E	0:00	0	0:00	0:00	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
L	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	0:00	0	0:00	0:00	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	
S	0:00	0	0:00	0:00	
T	0:00	0	0:00	0:00	
U	0:00	0	0:00	0:00	

Project:

Alternatief 5: Wolk

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Calculated:

21-11-2013 10:53/2.7.490

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SHADOW - Main Result

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

No.	Name	Worst case	Expected
		[h/year]	[h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (98)	0:00	0:00
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (99)	0:00	0:00
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (100)	0:00	0:00
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (101)	0:00	0:00
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (102)	0:00	0:00
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (103)	0:00	0:00
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (104)	0:00	0:00
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (105)	0:00	0:00
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (106)	0:00	0:00
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (107)	0:00	0:00
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (108)	0:00	0:00
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (109)	0:00	0:00
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (110)	0:00	0:00
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (111)	0:00	0:00
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (112)	0:00	0:00
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (113)	0:00	0:00
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (114)	0:00	0:00
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (115)	0:00	0:00
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (116)	0:00	0:00
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (117)	0:00	0:00
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (118)	0:00	0:00
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (119)	0:00	0:00
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (120)	0:00	0:00
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (121)	0:00	0:00
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (122)	0:00	0:00
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (123)	0:00	0:00
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (124)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (125)	0:00	0:00
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (126)	0:00	0:00
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (127)	0:00	0:00
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (128)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (129)	0:00	0:00

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Calculated:

14-11-2013 13:07/2.7.490

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:100.000

New WTG

Shadow receptor

WTGs

RD1	East North		Z	Row data/Description	WTG type			Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Shadow data	
	East	North			Valid	Manufact.	Type-generator				Calculation distance [m]	RPM [RPM]
RD1			[m]									
1	69.225	410.594	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
2	69.496	410.706	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
3	69.821	410.949	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
4	69.769	410.442	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
5	70.006	409.278	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
6	70.389	409.415	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
7	70.940	409.460	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
8	68.586	408.901	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
9	68.956	409.080	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
10	69.324	409.092	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
11	69.673	409.103	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
12	70.312	409.014	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
13	70.715	409.138	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
14	71.172	409.153	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
15	71.520	409.063	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
16	69.794	408.636	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
17	69.394	408.595	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
18	68.995	408.541	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
19	68.596	408.493	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
20	68.889	408.277	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
21	69.239	408.193	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
22	69.677	408.291	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
23	70.019	408.274	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
24	69.957	407.909	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
25	70.324	407.656	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
26	70.688	407.406	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
27	71.047	407.250	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
28	71.432	407.452	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
29	71.071	407.638	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
30	70.717	407.822	0,0	Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

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Project:

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
31	70.425	408.113	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
32	70.337	408.523	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
33	70.761	408.640	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
34	71.201	408.614	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
35	71.639	408.660	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	67.357	407.796	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
B	67.146	407.658	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
C	68.328	406.859	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
D	69.309	406.117	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
E	68.919	410.377	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
F	68.499	407.277	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
G	68.507	407.242	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
H	68.482	407.225	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
I	69.974	413.061	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
J	71.222	412.326	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
K	72.035	411.587	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
L	70.470	406.046	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
M	71.530	405.917	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
N	72.594	411.147	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
O	72.751	410.960	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
P	67.912	410.730	0,0	0,1	0,1	2,0	-180,0	90,0	"Green house mode"
Q	71.930	411.900	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
R	71.657	412.081	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
S	71.814	412.013	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
T	71.613	412.117	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
U	72.336	411.169	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	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	0:00	0	0:00	0:00	
B	0:00	0	0:00	0:00	
C	0:00	0	0:00	0:00	
D	0:00	0	0:00	0:00	
E	34:35	83	0:35	8:40	
F	0:00	0	0:00	0:00	
G	0:00	0	0:00	0:00	
H	0:00	0	0:00	0:00	
I	0:00	0	0:00	0:00	
J	0:00	0	0:00	0:00	
K	0:00	0	0:00	0:00	
L	0:00	0	0:00	0:00	
M	0:00	0	0:00	0:00	
N	0:00	0	0:00	0:00	
O	0:00	0	0:00	0:00	
P	3:33	21	0:16	0:40	
Q	0:00	0	0:00	0:00	
R	0:00	0	0:00	0:00	

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Project:

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SHADOW - Main Result

...continued from previous page

Shadow, worst case				Shadow, expected values
No.	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]
S	0:00	0	0:00	0:00
T	0:00	0	0:00	0:00
U	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	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (81)	3:32	0:40
2	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (82)	16:31	4:17
3	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (83)	3:49	0:59
4	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (84)	16:04	3:50
5	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (85)	0:00	0:00
6	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (86)	0:00	0:00
7	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (87)	0:00	0:00
8	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (88)	0:00	0:00
9	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (89)	0:00	0:00
10	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (90)	0:00	0:00
11	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (91)	0:00	0:00
12	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (92)	0:00	0:00
13	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (93)	0:00	0:00
14	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (94)	0:00	0:00
15	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (95)	0:00	0:00
16	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (96)	0:00	0:00
17	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (97)	0:00	0:00
18	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (98)	0:00	0:00
19	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (99)	0:00	0:00
20	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (100)	0:00	0:00
21	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (101)	0:00	0:00
22	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (102)	0:00	0:00
23	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (103)	0:00	0:00
24	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (104)	0:00	0:00
25	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (105)	0:00	0:00
26	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (106)	0:00	0:00
27	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (107)	0:00	0:00
28	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (108)	0:00	0:00
29	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (109)	0:00	0:00
30	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (110)	0:00	0:00
31	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (111)	0:00	0:00
32	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (112)	0:00	0:00
33	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (113)	0:00	0:00
34	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (114)	0:00	0:00
35	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (115)	0:00	0:00

Project:

Alternatief 1: Enkele lijn

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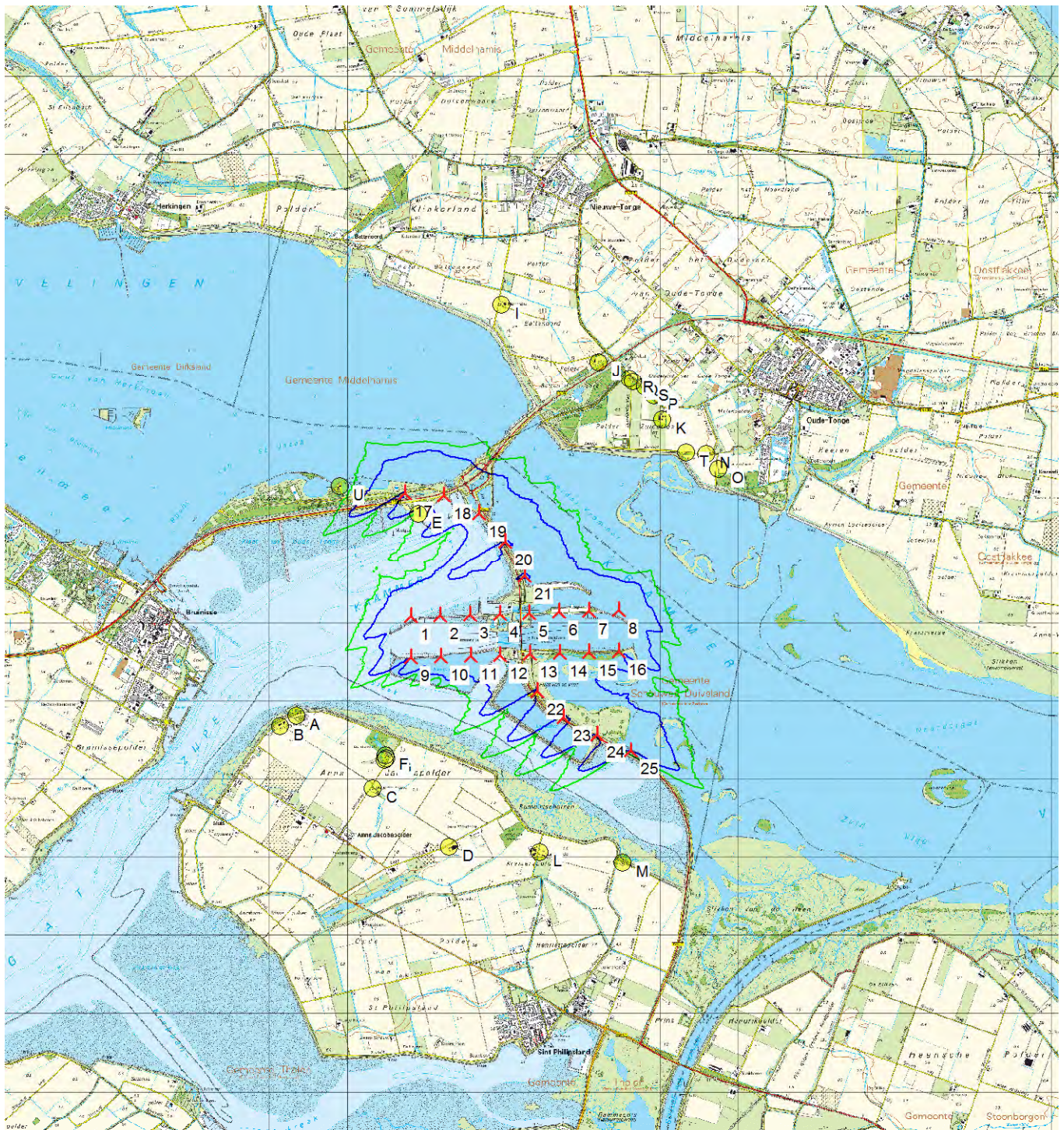
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02-12-2013 9:53/2.7.490

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SHADOW - Map



0 1 2 3 4 km

Map: 100k, Print scale 1:75.000, Map center RD1 (NL) East: 70.120 North: 409.593

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6 15

Project:

Alternatief 2: Dubbele lijn

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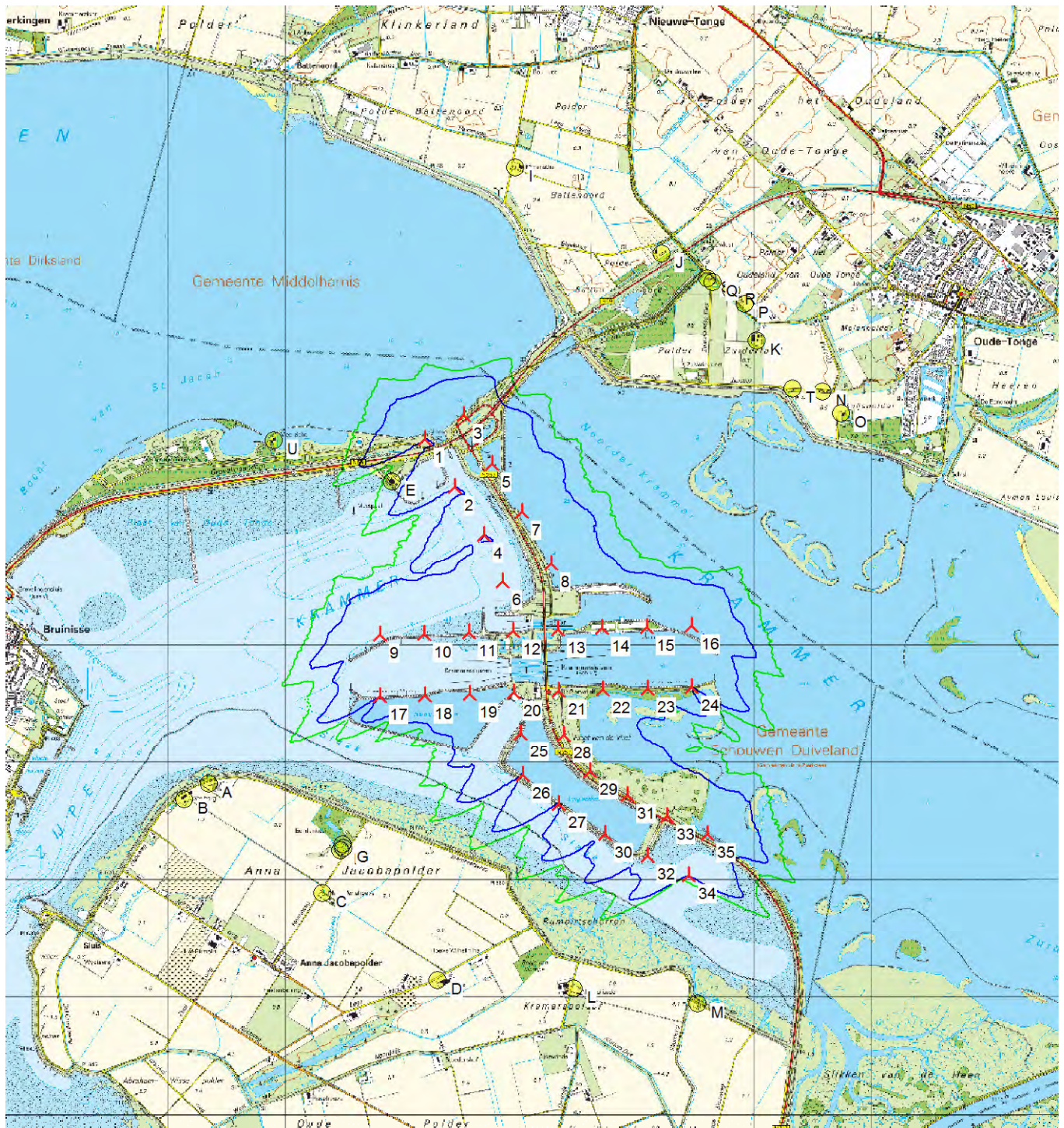
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SHADOW - Map



0 500 1000 1500 2000 m

Map: 100k, Print scale 1:50.000, Map center RD1 (NL) East: 69.960 North: 409.612

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6

15

Project:

Alternatief 3: Dubbele wolk

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Calculated:

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SHADOW - Map



0 1 2 3 4 km

Map: 100k, Print scale 1:75.000, Map center RD1 (NL) East: 70.220 North: 409.723

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6

15

Project:

Alternatief 4: Grote wolk

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Calculated:

02-12-2013 11:02/2.7.490

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SHADOW - Map



0 1 2 3 4 km

Map: 100k, Print scale 1:75.000, Map center RD1 (NL) East: 69.960 North: 409.863

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6

15

Project:

Alternatief 5: Wolk

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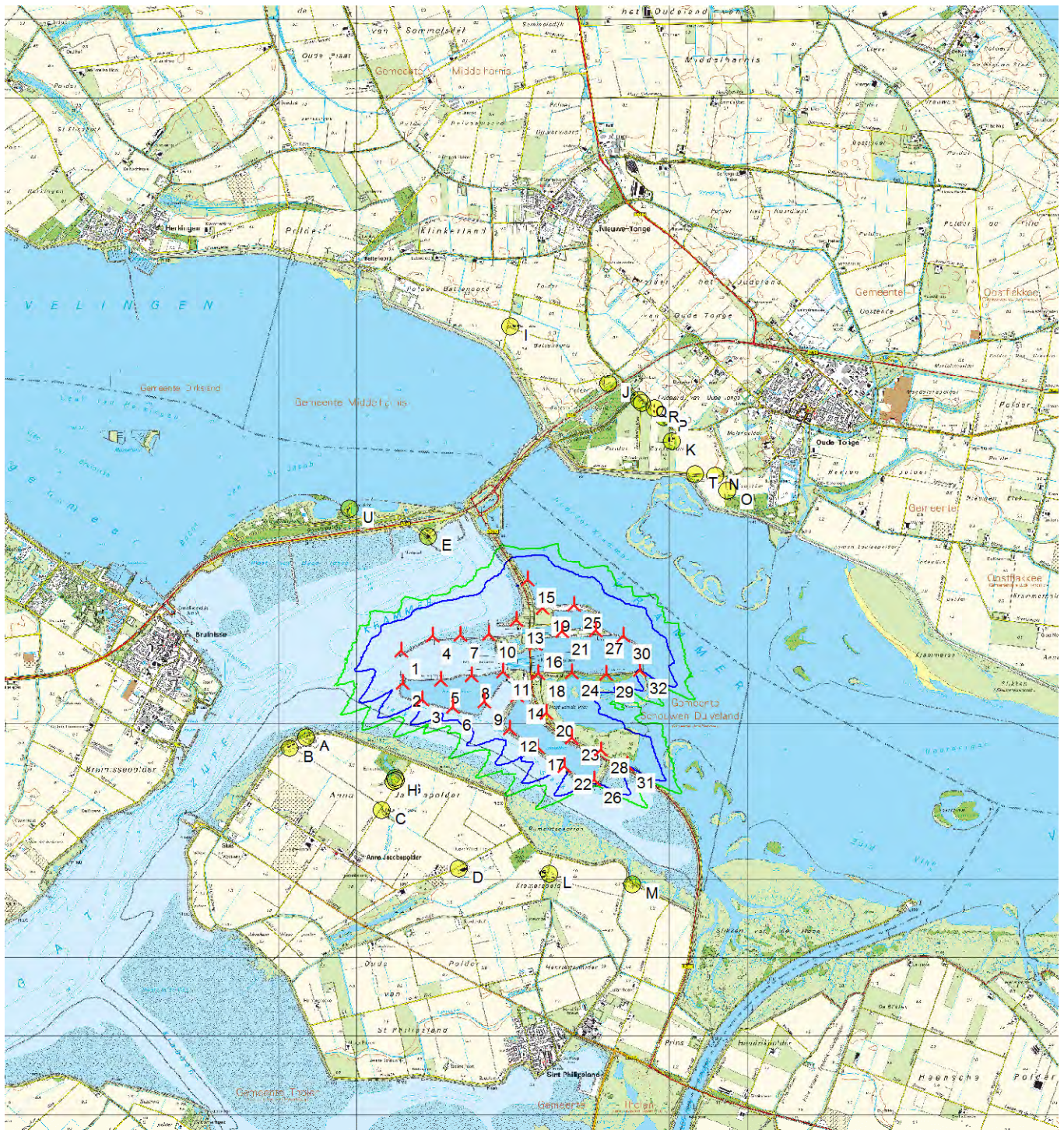
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02-12-2013 11:14/2.7.490

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SHADOW - Map



0 1 2 3 4 km

Map: 100k, Print scale 1:75.000, Map center RD1 (NL) East: 70.000 North: 409.872

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6

15

Project:

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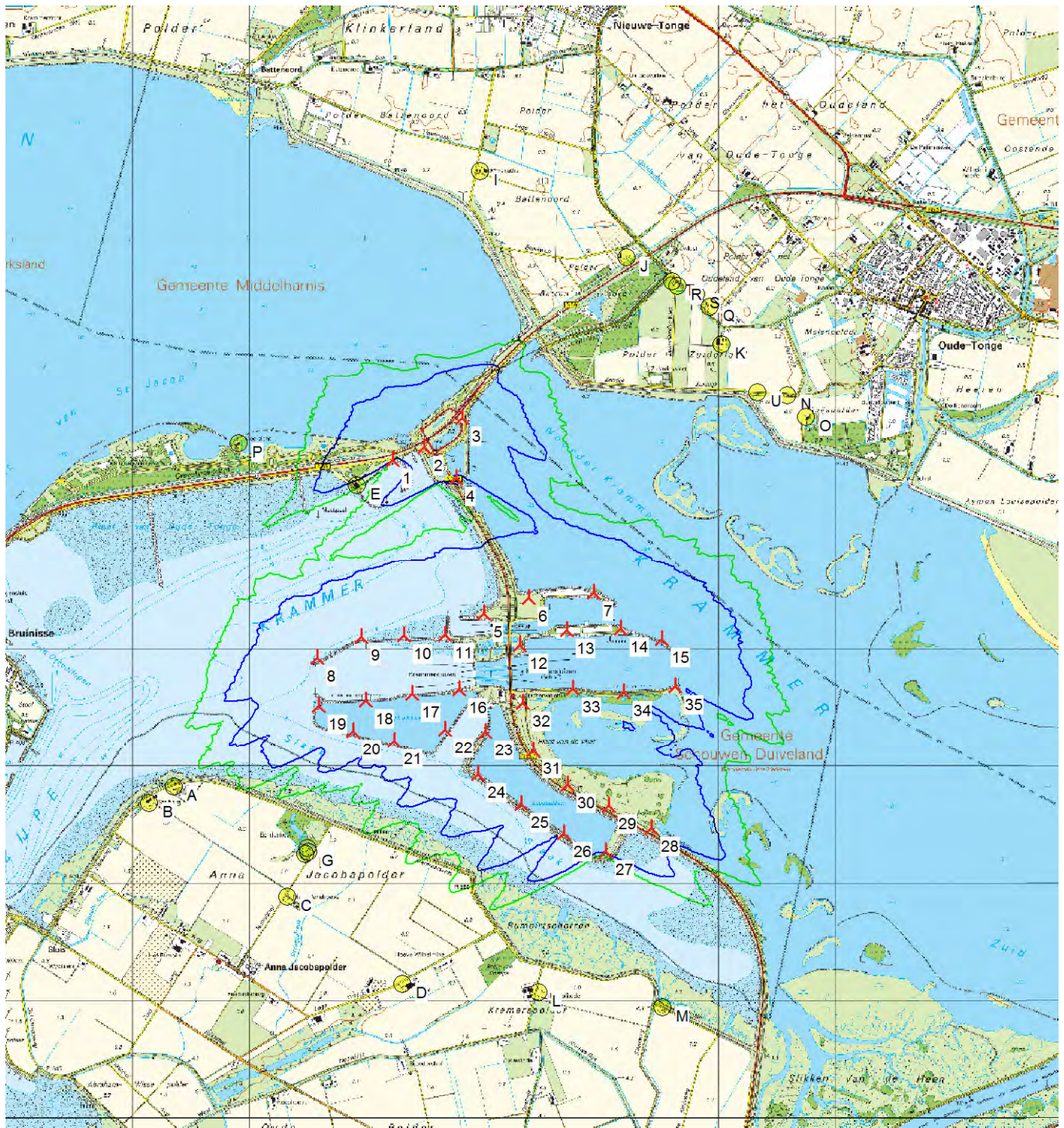
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SHADOW - Map



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Map: 100k, Print scale 1:50.000, Map center RD1 (NL) East: 70.260 North: 409.643

New WTG

Shadow receptor

Isolines showing shadow in Hours per year, real case

6

15

Project:

Alternatief 1: Enkele lijn

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SHADOW - Calendar

Calculation: Variant 1: Enkele lijnShadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	08:08 (20) 20:16	07:57 (19) 21:06	05:32 21:52
2	08:51 16:45	08:23 17:33	07:29 18:24	08:06 (20) 20:18	07:54 (19) 21:08	05:31 21:53
3	08:50 16:46	08:21 17:35	07:27 18:26	08:04 (20) 20:19	07:52 (19) 21:10	05:31 21:54
4	08:50 16:47	08:20 17:37	07:25 18:28	08:01 (20) 20:21	07:50 (19) 21:11	05:30 21:55
5	08:50 16:49	08:18 17:39	07:23 18:30	07:59 (20) 20:23	07:48 (19) 21:13	05:29 21:56
6	08:50 16:50	08:16 17:41	07:20 18:31	07:57 (20) 20:24	07:45 (19) 21:15	05:29 21:57
7	08:49 16:51	08:15 17:42	07:18 18:33	07:55 (20) 20:26	07:43 (19) 21:16	05:28 21:58
8	08:49 16:52	08:13 17:44	07:16 18:35	07:52 (20) 20:28	07:41 (19) 21:18	05:28 21:59
9	08:48 16:54	08:11 17:46	07:14 18:37	07:50 (20) 20:29	07:41 (19) 21:19	05:27 21:59
10	08:48 16:55	08:09 17:48	07:12 08:49 (21) 18:38	07:50 (20) 20:31	07:40 (19) 21:21	05:27 22:00
11	08:47 16:56	08:07 17:50	07:09 08:51 (21) 18:40	07:50 (20) 20:33	07:40 (19) 21:23	05:26 22:01
12	08:47 16:58	08:06 17:52	07:07 08:45 (21) 18:42	07:51 (20) 20:35	07:39 (19) 21:24	05:26 22:02
13	08:46 16:59	08:04 17:54	07:05 08:43 (21) 18:44	07:53 (20) 20:36	07:39 (19) 21:26	05:26 22:02
14	08:45 17:01	08:02 17:55	07:03 08:41 (21) 18:45	07:52 (20) 20:38	07:40 (19) 21:27	05:25 22:03
15	08:44 17:02	08:00 17:57	07:00 08:39 (21) 18:47	07:50 (20) 20:40	07:40 (19) 21:29	05:25 22:03
16	08:44 17:04	07:58 17:59	06:58 08:37 (21) 18:49	07:48 (20) 20:41	07:40 (19) 21:30	05:25 22:04
17	08:43 17:06	07:56 18:01	06:56 08:39 (21) 18:51	07:46 (20) 20:43	07:41 (19) 21:32	05:25 22:04
18	08:42 17:07	07:54 18:03	06:53 18:52	07:44 (20) 20:45	07:42 (19) 21:33	05:25 22:05
19	08:41 17:09	07:52 18:05	06:51 18:54	07:43 (20) 20:46	07:43 (19) 21:35	05:25 22:05
20	08:40 17:10	07:50 18:06	06:49 18:56	07:42 (20) 20:48	07:44 (19) 21:36	05:25 22:05
21	08:39 17:12	07:48 18:08	06:47 18:57	07:41 (20) 20:50	07:45 (19) 21:38	05:25 22:06
22	08:38 17:14	07:46 18:10	06:44 18:59	07:40 (20) 20:51	07:47 (19) 21:39	05:26 22:06
23	08:36 17:15	07:44 18:12	06:42 19:01	07:39 (20) 20:53	07:51 (19) 21:40	05:26 22:06
24	08:35 17:17	07:42 18:14	06:40 19:02	07:38 (20) 20:55	07:59 (19) 21:42	05:26 22:06
25	08:34 17:19	07:40 18:15	06:37 19:04	07:37 (20) 20:56	07:58 (19) 21:43	05:26 22:06
26	08:33 17:21	07:38 18:17	06:35 19:06	07:36 (20) 20:58	07:57 (19) 21:44	05:27 22:06
27	08:31 17:22	07:36 18:19	06:33 19:08	07:35 (20) 21:00	07:56 (19) 21:46	05:27 22:06
28	08:30 17:24	07:33 18:21	06:30 19:09	07:34 (20) 21:01	07:55 (19) 21:47	05:28 22:06
29	08:29 17:26		06:28 20:11	07:33 (20) 21:03	07:54 (19) 21:48	05:28 22:06
30	08:27 17:28		07:26 20:13	08:01 (19) 21:05	07:53 (19) 21:49	05:29 22:06
31	08:26 17:30		07:24 20:14	08:00 (19) 21:06	07:52 (19) 21:51	05:30 22:06
Potential sun hours	260	278	367	416	484	497
Total, worst case		56	212	668		
Sun reduction		0,27	0,30	0,38		
Oper. time red.		0,97	0,97	0,97		
Wind dir. red.		0,57	0,55	0,61		
Total reduction		0,15	0,16	0,23		
Total, real		8	34	151		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn

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SHADOW - Calendar

Calculation: Variant 1: Enkele lijnShadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06	06:06 21:34	06:55 20:33	07:39 (19) 19:24	07:43 15 08:31 (20)	07:36 2 08:19 (21)
2	05:30 22:05	06:07 21:32	06:56 20:30	07:38 (19) 18 08:16 (19)	19:24 18 08:47 (20)	17:18 16:38
3	05:31 22:05	06:09 21:31	06:58 20:28	07:39 (19) 37 08:16 (19)	19:24 21 08:49 (20)	17:16 16:37
4	05:32 22:04	06:10 21:29	07:00 20:26	07:38 (19) 37 08:15 (19)	19:24 22 08:48 (20)	17:14 16:36
5	05:32 22:04	06:12 21:27	07:01 20:24	07:40 (19) 34 08:14 (19)	19:24 21 08:49 (20)	17:13 16:36
6	05:33 22:03	06:13 21:26	07:03 20:21	07:41 (19) 32 08:13 (19)	19:24 19 08:49 (20)	17:11 16:35
7	05:34 22:03	06:15 21:24	07:04 20:19	07:43 (19) 30 08:13 (19)	19:24 18 08:50 (20)	17:10 16:35
8	05:35 22:02	06:16 21:22	07:06 20:17	07:44 (19) 27 08:11 (19)	19:24 15 08:48 (20)	17:08 16:35
9	05:36 22:02	06:18 21:20	07:08 20:14	07:46 (19) 24 08:10 (19)	19:24 13 08:48 (20)	17:06 16:34
10	05:37 22:01	06:19 21:18	07:09 20:12	07:47 (19) 21 08:08 (19)	19:24 11 08:48 (20)	17:05 16:34
11	05:38 22:00	06:21 21:16	07:11 20:10	07:49 (19) 17 08:06 (19)	19:24 8 08:47 (20)	17:04 16:34
12	05:39 21:59	06:23 21:15	07:12 20:08	07:51 (19) 14 08:05 (19)	19:24 5 08:45 (20)	17:03 16:34
13	05:40 21:58	06:24 21:13	07:14 20:05	07:52 (19) 9 08:01 (19)	19:24 2 08:44 (20)	17:02 16:34
14	05:41 21:58	06:26 21:11	07:16 20:03	07:54 (19) 2 07:55 (19)	19:24 18:55	16:58 16:34
15	05:42 21:57	06:27 21:09	07:17 20:01	18:55 18:52	16:57 16:55	16:34 16:34
16	05:44 21:56	06:29 21:07	07:19 19:58	18:52 18:50	16:55 16:54	16:34 16:34
17	05:45 21:54	06:31 21:05	07:20 19:56	18:50 18:48	16:54 16:52	16:34 16:34
18	05:46 21:53	06:32 21:03	07:22 19:54	18:48 18:46	16:52 16:51	16:34 16:35
19	05:47 21:52	06:34 21:01	07:24 19:51	18:46 18:44	16:51 16:50	16:35 16:35
20	05:49 21:51	06:35 20:59	07:25 19:49	18:45 18:42	16:50 16:49	16:37 16:35
21	05:50 21:50	06:37 20:56	07:27 19:47	18:42 18:40	16:49 16:48	16:37 16:36
22	05:51 21:49	06:39 20:54	07:28 19:44	18:40 18:38	16:48 16:46	16:36 16:36
23	05:53 21:47	06:40 20:52	07:30 19:42	18:39 18:36	16:47 16:45	16:36 16:37
24	05:54 21:46	06:42 20:50	07:32 19:40	18:38 18:34	16:46 16:44	16:37 16:37
25	05:55 21:45	06:43 20:48	07:33 19:37	18:37 17:32	16:45 9 08:07 (21)	16:37 16:43
26	05:57 21:43	06:45 20:46	07:35 19:35	17:31 17:30	16:44 11 08:18 (21)	16:38 16:42
27	05:58 21:42	06:47 20:44	07:37 19:33	17:29 17:28	16:43 10 08:19 (21)	16:39 16:41
28	06:00 21:40	06:48 20:41	07:38 19:31	17:28 17:26	16:42 9 08:20 (21)	16:40 16:40
29	06:01 21:39	06:50 20:39	07:40 19:28	17:26 17:24	16:41 7 08:20 (21)	16:40 16:40
30	06:03 21:37	06:51 20:37	07:41 19:26	17:24 9 08:35 (20)	16:40 6 08:21 (21)	16:41 16:42
31	06:04 21:36	06:53 20:35	07:39 (19) 37 08:16 (19)	17:23 17:20	16:39 4 08:21 (21)	16:42 16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case		339	368	244	2	
Sun reduction		0,42	0,36	0,31	0,22	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,61	0,61	0,55	0,57	
Total reduction		0,25	0,21	0,16	0,12	
Total, real		85	78	40	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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn

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17-03-2014 13:55 / 22

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 11:59/2.7.490

Witteveen+Bos

SHADOW - Calendar

Calculation: Variant 1: Enkele lijn Shadow receptor: U - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 90,0° (21)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:51	08:24	07:31	07:21	08:06 (17)	06:17	05:32	05:29	06:06	06:55	07:43	08:27
	16:44	17:31	18:23	20:16	08:38 (17)	21:06	21:52	22:06	21:34	20:33	19:24	17:18
2	08:51	08:23	07:29	07:19	08:05 (17)	06:15	05:32	05:30	06:07	06:56	07:45	08:28
	16:45	17:33	18:24	20:18	08:37 (17)	21:08	21:53	22:05	21:33	20:30	19:21	17:16
3	08:51	08:21	07:27	07:17	08:06 (17)	06:13	05:31	05:31	06:09	06:58	07:46	08:30
	16:46	17:35	18:26	20:19	08:36 (17)	21:10	21:54	22:05	21:31	20:28	19:19	17:15
4	08:50	08:20	07:25	07:15	08:07 (17)	06:11	05:30	05:32	06:10	07:00	07:48	08:31
	16:47	17:37	18:28	20:21	08:35 (17)	21:11	21:55	22:04	21:29	20:26	19:17	17:13
5	08:50	08:18	07:23	07:12	08:08 (17)	06:10	05:29	05:32	06:12	07:01	07:50	08:32
	16:49	17:39	18:30	20:23	08:33 (17)	21:13	21:56	22:04	21:27	20:24	19:15	17:11
6	08:50	08:16	07:20	07:10	08:09 (17)	06:08	05:29	05:33	06:13	07:03	08:05 (17)	07:45
	16:50	17:41	18:31	20:24	08:32 (17)	21:15	21:57	22:04	21:26	20:21	19:12	17:09
7	08:49	08:15	07:18	07:08	08:10 (17)	06:06	05:28	05:34	06:15	07:04	08:03 (17)	07:53
	16:51	17:42	18:33	20:26	08:28 (17)	21:16	21:58	22:03	21:24	20:19	19:10	17:08
8	08:49	08:13	07:16	07:06	08:13 (17)	06:04	05:28	05:35	06:16	07:06	08:01 (17)	07:55
	16:52	17:44	18:35	20:28	08:25 (17)	21:18	21:59	22:02	21:22	20:17	19:08	17:06
9	08:48	08:11	07:14	07:03	06:03	05:27	05:36	06:18	07:08	08:00 (17)	07:57	07:51
	16:54	17:46	18:37	20:30	21:19	21:59	22:02	21:20	20:15	19:06	17:04	16:35
10	08:48	08:09	07:12	07:01	06:01	05:27	05:37	06:19	07:09	07:59 (17)	07:58	07:52
	16:55	17:48	18:38	20:31	21:21	22:00	22:01	21:18	20:12	19:03	17:03	16:34
11	08:47	08:08	07:09	06:59	05:59	05:26	05:38	06:21	07:11	07:58 (17)	08:00	07:54
	16:56	17:50	18:40	20:33	21:23	22:01	22:00	21:16	20:10	19:01	17:01	16:34
12	08:47	08:06	07:07	06:57	05:58	05:26	05:39	06:23	07:12	07:58 (17)	08:02	07:56
	16:58	17:52	18:42	20:35	21:24	22:02	21:59	21:15	20:08	18:59	17:00	16:34
13	08:46	08:04	07:05	06:54	05:56	05:26	05:40	06:24	07:14	07:56 (18)	08:03	07:58
	16:59	17:54	18:44	20:36	21:26	22:02	21:58	21:13	20:05	18:57	16:58	16:34
14	08:45	08:02	07:03	06:52	05:54	05:25	05:41	06:26	07:16	07:54 (18)	08:05	07:59
	17:01	17:55	18:45	20:38	21:27	22:03	21:58	21:11	20:03	18:55	16:57	16:34
15	08:45	08:00	07:00	06:50	05:53	05:25	05:42	06:27	07:17	07:55 (18)	08:07	08:01
	17:02	17:57	18:47	20:40	21:29	22:04	21:57	21:09	20:01	18:52	16:55	16:34
16	08:44	07:58	06:58	06:48	05:51	05:25	05:44	06:29	07:19	07:57 (17)	08:08	08:03
	17:04	17:59	18:49	20:41	21:30	22:04	21:56	21:07	19:58	18:50 (17)	18:50	16:34
17	08:43	07:56	06:56	06:46	05:50	05:25	05:45	06:31	07:20	07:58 (17)	08:10	08:05
	17:06	18:01	18:51	20:43	21:32	22:04	21:55	21:05	19:56	18:48 (17)	18:48	16:53
18	08:42	07:54	06:53	06:44	05:48	05:25	05:46	06:32	07:22	08:00 (17)	08:12	08:06
	17:07	18:03	18:52	20:45	21:33	22:05	21:53	21:03	19:54	18:46 (17)	18:46	16:51
19	08:41	07:52	06:51	06:41	05:47	05:25	05:47	06:34	07:24	08:02 (17)	08:14	08:08
	17:09	18:05	18:54	20:46	21:35	22:05	21:52	21:01	19:51	18:44 (17)	18:44	16:50
20	08:40	07:50	06:49	06:39	05:46	05:25	05:49	06:35	07:25	08:03 (17)	08:15	08:10
	17:10	18:06	18:56	20:48	21:36	22:06	21:51	20:59	19:49	18:26 (17)	18:42	16:49
21	08:39	07:48	06:47	06:37	05:44	05:25	05:50	06:37	07:27	08:05 (17)	08:17	08:11
	17:12	18:08	18:57	20:50	21:38	22:06	21:50	20:56	19:47	18:25 (17)	18:40	16:48
22	08:38	07:46	06:44	06:35	05:43	05:26	05:51	06:39	07:29	08:06 (17)	08:19	08:13
	17:14	18:10	18:59	20:51	21:39	22:06	21:49	20:54	19:44	18:22 (17)	18:38	16:46
23	08:37	07:44	06:42	06:33	05:42	05:26	05:53	06:40	07:30	08:08 (17)	08:21	08:15
	17:16	18:12	19:01	20:53	21:40	22:06	21:47	20:52	19:42	18:21 (17)	18:36	16:45
24	08:35	07:42	06:40	06:31	05:41	05:26	05:54	06:42	07:32	08:10 (17)	08:22	08:16
	17:17	18:14	19:03	20:55	21:42	22:06	21:46	20:50	19:40	18:18 (17)	18:34	16:44
25	08:34	07:40	06:37	06:29	05:39	05:26	05:55	06:43	07:33	08:11 (17)	07:24	08:18
	17:19	18:15	19:04	20:56	21:43	22:06	21:45	20:48	19:38	18:14 (17)	17:32	16:43
26	08:33	07:38	06:35	06:27	05:38	05:27	05:57	06:45	07:35	08:13 (19)	07:26	08:19
	17:21	18:17	19:06	20:58	21:44	22:06	21:43	20:46	19:35	18:17 (19)	17:30	16:42
27	08:31	07:36	06:33	06:25	05:37	05:27	05:58	06:47	07:37	08:15 (19)	07:28	08:21
	17:22	18:19	19:08	21:00	21:46	22:06	21:42	20:44	19:33	18:19 (19)	17:28	16:41
28	08:30	07:34	06:31	06:23	05:36	05:28	06:00	06:48	07:38	08:16 (19)	07:29	08:23
	17:24	18:21	19:09	21:01	21:47	22:06	21:40	20:42	19:31	18:20 (19)	17:26	16:41
29	08:29	07:28	06:21	06:21	05:35	05:28	06:01	06:50	07:40	08:18 (19)	07:31	08:24
	17:26	18:23	19:11	21:03	21:48	22:06	21:39	20:39	19:28	18:20 (19)	17:24	16:40
30	08:27	07:26	06:19	06:19	05:34	05:29	06:03	06:52	07:42	08:20 (19)	07:33	08:25
	17:28	18:25	19:13	21:05	21:49	22:06	21:37	20:37	19:26	18:21 (19)	17:22	16:39
31	08:26	07:24	06:17	06:17	05:33	05:28	06:04	06:53	07:43	08:21 (19)	07:35	08:21
	17:30	18:27	19:15	21:07	21:51	22:06	21:36	20:35	19:24	18:22 (19)	17:20	16:43
Potential sun hours	260	278	367	416	484	497	501	453	381	332	267	245
Total, worst case			341	200					552			
Sun reduction			0,30	0,38					0,36			
Oper. time red.			0,97	0,97					0,97			
Wind dir. red.			0,59	0,59					0,59			
Total reduction			0,17	0,22					0,21			
Total, real			59	44					114			

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)

Project:

Alternatief 2: Dubbele lijn

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17-03-2014 14:01 / 5

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 12:09/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	07:58 (2) 08:41 (2)	06:17 21:06
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:57 (2) 08:39 (2)	06:15 21:08
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:57 (2) 08:39 (2)	06:13 21:10
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	07:58 (2) 08:38 (2)	06:11 21:11
5	08:50 16:49	08:18 17:39	07:23 18:30	07:12 20:23	07:58 (2) 08:38 (2)	06:10 21:13
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	07:57 (2) 08:36 (2)	06:08 21:15
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	07:58 (2) 08:35 (2)	06:06 21:16
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	07:59 (2) 08:34 (2)	06:04 21:18
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	08:00 (2) 08:33 (2)	06:03 21:19
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	08:01 (2) 08:31 (2)	06:01 21:21
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	08:03 (2) 08:29 (2)	05:59 21:23
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	08:04 (2) 08:26 (2)	05:58 21:24
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36	07:30 (5) 08:23 (2)	05:56 21:26
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38	07:28 (5) 08:18 (2)	05:54 21:27
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	07:26 (5) 07:33 (5)	05:53 21:29
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	07:24 (5) 07:33 (5)	05:51 21:30
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43	07:22 (5) 07:33 (5)	05:50 21:32
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45	07:20 (5) 07:33 (5)	05:48 21:33
19	08:41 17:09	07:52 09:27 (6)	06:51 18:54	06:41 20:46	07:18 (5) 07:33 (5)	05:47 21:35
20	08:40 17:10	07:50 09:25 (6)	06:49 18:56	06:39 20:48	07:16 (5) 07:33 (5)	05:46 21:36
21	08:39 17:12	07:48 09:23 (6)	06:47 18:57	06:37 20:50	07:14 (5) 07:32 (5)	05:44 21:38
22	08:38 17:14	07:46 09:22 (6)	06:44 18:59	06:35 20:51	07:12 (5) 07:31 (5)	05:43 21:39
23	08:36 17:15	07:44 09:20 (6)	06:42 19:01	06:33 20:53	07:10 (5) 07:30 (5)	05:42 21:40
24	08:35 17:17	07:42 09:19 (6)	06:40 19:02	06:31 20:55	07:08 (5) 07:29 (5)	05:40 21:42
25	08:34 17:19	07:40 09:17 (6)	06:37 19:04	06:29 20:56	07:08 (5) 07:28 (5)	05:39 21:43
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	07:10 (5) 07:26 (5)	05:38 21:44
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	07:11 (5) 07:24 (5)	05:37 21:46
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	07:14 (5) 07:20 (5)	05:36 21:47
29	08:29 17:26		06:28 20:11	06:21 21:03		05:35 21:48
30	08:27 17:28		06:26 20:13	06:19 21:05		05:34 21:49
31	08:26 17:30		06:24 20:14	06:17 21:06		05:33 21:51
Potential sun hours	260	278	367	416	484	497
Total, worst case	31	182	388	666		
Sun reduction	0,18	0,27	0,30	0,38		
Oper. time red.	0,97	0,97	0,97	0,97		
Wind dir. red.	0,56	0,57	0,59	0,60		
Total reduction	0,10	0,15	0,17	0,22		
Total, real	3	27	67	149		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

Alternatief 2: Dubbele lijn

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17-03-2014 14:01 / 6

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Witteveen+Bos

Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 12:09/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06	06:06 21:34	06:55 20:33	08:02 (2) 19:24	08:21 (7) 17:18	08:19 (4) 16:38
2	05:30 22:05	06:07 21:32	06:56 20:30	07:59 (2) 19:21	08:23 (7) 17:16	08:21 (4) 16:38
3	05:31 22:05	06:09 21:31	06:58 20:28	07:58 (2) 19:19	08:25 (7) 17:14	08:23 (4) 16:37
4	05:32 22:04	06:10 21:29	07:00 20:26	07:56 (2) 19:17	08:26 (7) 17:13	08:24 (4) 16:36
5	05:32 22:04	06:12 21:27	07:01 20:24	07:55 (2) 19:15	08:28 (7) 17:11	08:25 (4) 16:36
6	05:33 22:03	06:13 21:26	07:03 20:21	07:54 (2) 19:12	08:29 (7) 17:09	08:26 (4) 16:35
7	05:34 22:03	06:15 21:24	07:04 20:19	07:53 (2) 19:10	08:30 (7) 17:08	08:27 (4) 16:35
8	05:35 22:02	06:16 21:22	07:06 20:17	07:52 (2) 19:08	08:31 (7) 17:06	08:28 (4) 16:35
9	05:36 22:02	06:18 21:20	07:08 20:14	07:51 (2) 19:06	08:32 (7) 17:04	08:29 (4) 16:34
10	05:37 22:01	06:19 21:18	07:09 20:12	07:50 (2) 19:03	08:33 (7) 17:03	08:30 (4) 16:34
11	05:38 22:00	06:21 21:16	07:11 20:10	07:50 (2) 19:01	08:34 (7) 17:01	08:31 (4) 16:34
12	05:39 21:59	06:23 21:15	07:12 20:08	07:51 (2) 18:59	08:35 (7) 17:00	08:32 (4) 16:34
13	05:40 21:58	06:24 21:13	07:14 20:05	07:52 (2) 18:57	08:36 (7) 16:58	08:33 (4) 16:34
14	05:41 21:58	06:26 21:11	07:16 20:03	07:54 (2) 18:55	08:37 (7) 16:57	08:34 (4) 16:34
15	05:42 21:57	06:27 21:09	07:17 (5) 20:01	07:55 (2) 18:52	08:38 (7) 16:55	08:35 (4) 16:34
16	05:44 21:56	06:29 21:07	07:19 (5) 19:58	07:57 (2) 18:50	08:39 (7) 16:54	08:36 (4) 16:34
17	05:45 21:54	06:31 21:05	07:20 (5) 19:56	07:58 (2) 18:48	08:40 (7) 16:52	08:37 (4) 16:34
18	05:46 21:53	06:32 21:03	07:22 (5) 19:54	08:00 (2) 18:46	08:41 (7) 16:51	08:38 (4) 16:35
19	05:47 21:52	06:34 21:01	07:24 (5) 19:51	08:02 (2) 18:44	08:42 (7) 16:50	08:39 (4) 16:35
20	05:49 21:51	06:35 20:59	07:25 (5) 19:49	08:03 (2) 18:42	08:43 (7) 16:49	08:40 (4) 16:35
21	05:50 21:50	06:37 20:56	07:27 (5) 19:47	08:05 (2) 18:40	08:44 (7) 16:48	08:41 (4) 16:36
22	05:51 21:49	06:39 20:54	07:28 (5) 19:44	08:06 (2) 18:38	08:45 (7) 16:46	08:42 (4) 16:36
23	05:53 21:47	06:40 20:52	07:30 (5) 19:42	08:08 (2) 18:36	08:46 (7) 16:45	08:43 (4) 16:37
24	05:54 21:46	06:42 20:50	07:32 (5) 19:40	08:10 (2) 18:34	08:47 (7) 16:44	08:44 (4) 16:37
25	05:55 21:45	06:43 20:48	07:33 (5) 19:37	08:11 (2) 18:32	08:48 (7) 16:43	08:45 (4) 16:38
26	05:57 21:43	06:45 20:46	07:35 (5) 19:35	08:13 (2) 18:30	08:49 (7) 16:42	08:46 (4) 16:39
27	05:58 21:42	06:47 20:44	07:37 (5) 19:33	08:14 (2) 18:28	08:50 (7) 16:41	08:47 (4) 16:40
28	06:00 21:40	06:48 20:41	07:38 (5) 19:31	08:16 (7) 18:26	08:51 (7) 16:40	08:48 (4) 16:40
29	06:01 21:39	06:50 20:39	07:39 (5) 19:28	08:17 (7) 18:24	08:52 (7) 16:39	08:49 (4) 16:41
30	06:03 21:37	06:51 20:37	07:41 (5) 19:26	08:19 (7) 18:22	08:53 (7) 16:38	08:50 (4) 16:42
31	06:04 21:36	06:53 20:35	08:03 (2) 19:24	08:21 (7) 18:20	08:54 (7) 16:37	08:51 (4) 16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case		264	788	193	42	
Sun reduction		0,42	0,36	0,31	0,22	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,62	0,59	0,56	0,56	
Total reduction		0,25	0,21	0,17	0,12	
Total, real		67	163	32	5	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn

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17-03-2014 14:01 / 22

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 12:09/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: U - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (21)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	07:57 (1) 2 07:59 (1)	06:17 21:06	05:32 21:52	05:29 22:06	06:06 21:34	06:55 20:33	07:43 19:24	07:36 17:18	08:27 16:38	
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:54 (1) 4 07:58 (1)	06:15 21:08	05:32 21:53	05:30 22:05	06:07 21:33	06:56 20:30	07:45 19:21	07:38 17:16	08:28 16:38	
3	08:51 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:52 (1) 4 07:56 (1)	06:13 21:10	05:31 21:54	05:31 22:05	06:09 21:31	06:58 20:28	07:46 19:19	07:40 17:15	08:30 16:37	
4	08:50 16:47	08:20 17:37	07:25 18:28	07:15 20:21	07:50 (1) 4 07:54 (1)	06:11 21:11	05:30 21:55	05:32 22:04	06:10 21:29	07:00 20:26	07:48 19:17	07:42 17:13	08:31 16:36	
5	08:50 16:49	08:18 17:39	07:23 18:30	07:22 20:23		06:10 21:13	05:29 21:56	05:32 22:04	06:12 21:27	07:01 20:24	07:50 19:15	07:44 17:11	08:32 16:36	
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24		06:08 21:15	05:29 21:57	05:33 22:04	06:13 21:26	07:03 20:21	07:51 19:12	07:45 17:09	08:34 16:36	
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26		06:06 21:16	05:28 21:58	05:34 22:03	06:15 21:24	07:04 20:19	07:53 19:10	07:47 17:08	08:35 16:35	
8	08:49 16:52	08:13 17:44	07:16 18:35	07:06 20:28		06:04 21:18	05:28 21:59	05:35 22:02	06:16 21:22	07:06 20:17	07:44 (1) 4 07:48 (1)	07:55 19:08	07:49 17:06	08:36 16:35
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:30		06:03 21:19	05:27 21:59	05:36 22:02	06:18 21:20	07:08 20:15	07:46 (1) 4 07:50 (1)	07:57 19:06	07:51 17:04	08:37 16:35
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31		06:01 21:21	05:27 22:00	05:37 22:01	06:19 21:18	07:09 20:12	07:47 (1) 4 07:51 (1)	07:58 19:03	07:52 17:03	08:38 16:34
11	08:47 16:56	08:08 17:50	07:09 18:40	06:59 20:33		05:59 21:23	05:26 22:01	05:38 22:00	06:21 21:16	07:11 20:10	07:49 (1) 3 07:52 (1)	08:00 19:01	07:54 17:01	08:40 16:34
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35		05:58 21:24	05:26 22:02	05:39 21:59	06:23 21:15	07:12 20:08	07:51 (1) 2 07:52 (1)	08:02 18:59	07:56 17:00	08:41 16:34
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36		05:56 21:26	05:26 22:02	05:40 21:58	06:24 21:13	07:14 20:05	08:03 18:57	07:58 16:58	08:42 16:34	
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38		05:54 21:27	05:25 22:03	05:41 21:58	06:26 21:11	07:16 20:03	08:05 18:55	07:59 16:57	08:42 16:34	
15	08:45 17:02	08:00 17:57	07:00 18:47	06:50 20:40		05:53 21:29	05:25 22:04	05:42 21:57	06:27 21:09	07:17 20:01	08:07 18:52	08:01 16:55	08:43 16:34	
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41		05:51 21:30	05:25 22:04	05:44 21:56	06:29 21:07	07:19 19:58	08:08 18:50	08:03 16:54	08:44 16:34	
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43		05:50 21:32	05:25 22:04	05:45 21:55	06:31 21:05	07:20 19:56	08:10 18:48	08:05 16:53	08:45 16:34	
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45		05:48 21:33	05:25 22:05	05:46 21:53	06:32 21:03	07:22 19:54	08:12 18:46	08:06 16:51	08:46 16:35	
19	08:41 17:09	07:52 18:05	06:51 18:54	06:41 20:46		05:47 21:35	05:25 22:05	05:47 21:52	06:34 21:01	07:24 19:51	08:14 18:44	08:08 16:50	08:46 16:35	
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48		05:46 21:36	05:25 22:06	05:49 21:51	06:35 20:59	07:25 19:49	08:15 18:42	08:10 16:49	08:47 16:35	
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50		05:44 21:38	05:25 22:06	05:50 21:50	06:37 20:56	07:27 19:47	08:17 18:40	08:11 16:48	08:48 16:36	
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51		05:43 21:39	05:26 22:06	05:51 21:49	06:39 20:54	07:29 19:44	08:19 18:38	08:13 16:46	08:48 16:36	
23	08:37 17:16	07:44 18:12	06:42 19:01	06:33 20:53		05:42 21:40	05:26 22:06	05:53 21:47	06:40 20:52	07:30 19:42	08:21 18:36	08:15 16:45	08:49 16:37	
24	08:35 17:17	07:42 18:14	06:40 19:03	06:31 20:55		05:41 21:42	05:26 22:06	05:54 21:46	06:42 20:50	07:32 19:40	08:22 18:34	08:16 16:44	08:49 16:37	
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56		05:39 21:43	05:26 22:06	05:55 21:45	06:43 20:48	07:33 19:38	07:24 17:32	08:18 16:43	08:50 16:38	
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58		05:38 21:44	05:27 22:06	05:57 21:43	06:45 20:46	07:35 19:35	07:26 17:30	08:19 16:42	08:50 16:39	
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00		05:37 21:46	05:27 22:06	05:58 21:42	06:47 20:44	07:37 19:33	07:28 17:28	08:21 16:41	08:50 16:39	
28	08:30 17:24	07:34 18:21	06:31 19:09	06:23 21:01		05:36 21:47	05:28 22:06	06:00 21:40	06:48 20:42	07:38 19:31	07:29 17:26	08:23 16:41	08:50 16:40	
29	08:29 17:26		07:28 20:11	06:21 21:03		05:35 21:48	05:28 22:06	06:01 21:39	06:50 20:39	07:40 19:28	07:31 17:24	08:24 16:40	08:51 16:41	
30	08:27 17:28		07:26 20:13	06:19 21:05		05:34 21:49	05:29 22:06	06:03 21:37	06:52 20:37	07:42 19:26	07:33 17:22	08:25 16:39	08:51 16:42	
31	08:26 17:30		07:24 20:14	07:59 (1) 2 08:00 (1)		05:33 21:51		06:04 21:36	06:53 20:35		07:35 17:20		08:51 16:43	
Potential sun hours	260	278	367	416		484	497	501	453	381	332	267	245	
Total, worst case			2							17				
Sun reduction			0,30			0,38				0,36				
Oper. time red.			0,97			0,97				0,97				
Wind dir. red.			0,61			0,61				0,61				
Total reduction			0,18			0,23				0,21				
Total, real			0			3				4				

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk

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17-03-2014 14:06 / 5

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 12:36/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	07:57 (38) 08:01 (38)	06:17 21:06
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:54 (35) 08:04 (35)	06:15 21:08
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:52 (35) 08:08 (35)	06:13 21:10
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	07:50 (35) 08:10 (35)	06:11 21:11
5	08:50 16:49	08:18 17:39	07:23 18:30	07:12 20:23	07:48 (35) 08:12 (35)	06:10 21:13
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	07:45 (35) 08:13 (35)	06:08 21:15
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	07:43 (35) 08:15 (35)	06:06 21:16
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	07:41 (35) 08:16 (35)	06:04 21:18
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	07:39 (35) 08:17 (35)	06:03 21:19
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	07:37 (35) 08:18 (35)	06:01 21:21
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	07:35 (35) 08:18 (35)	05:59 21:23
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	07:32 (35) 08:18 (35)	05:58 21:24
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36	07:30 (35) 08:18 (35)	05:56 21:26
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38	07:28 (35) 08:19 (35)	05:54 21:27
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	07:26 (35) 08:19 (35)	05:53 21:29
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	07:26 (35) 08:19 (35)	05:51 21:30
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43	07:25 (35) 08:19 (35)	05:50 21:32
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45	07:25 (35) 08:19 (35)	05:48 21:33
19	08:41 17:09	07:52 18:05	06:51 18:54	06:41 20:46	07:24 (35) 08:19 (35)	05:47 21:35
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	07:24 (35) 08:18 (35)	05:46 21:36
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50	07:24 (35) 08:18 (35)	05:44 21:38
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51	07:24 (35) 08:18 (35)	05:43 21:39
23	08:36 17:15	07:44 18:12	06:42 19:01	06:33 20:53	07:24 (35) 08:17 (35)	05:42 21:40
24	08:35 17:17	07:42 18:14	06:40 19:02	06:31 20:55	07:24 (35) 08:16 (35)	05:40 21:42
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56	07:24 (35) 08:16 (35)	05:39 21:43
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	07:24 (35) 08:15 (35)	05:38 21:44
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	07:24 (35) 08:14 (35)	05:37 21:46
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	07:24 (35) 08:13 (35)	05:36 21:47
29	08:29 17:26		07:28 20:11	06:21 21:03	07:26 (35) 08:13 (35)	05:35 21:48
30	08:27 17:28		07:26 20:13	06:19 21:05	07:26 (35) 08:12 (35)	05:34 21:49
31	08:26 17:30		07:24 20:14	07:59 (38) 08:00 (38)		05:33 21:51
Potential sun hours	260	278	367	416	484	497
Total, worst case			2	1267	473	
Sun reduction			0,30	0,38	0,43	
Oper. time red.			0,97	0,97	0,97	
Wind dir. red.			0,61	0,61	0,63	
Total reduction			0,18	0,23	0,26	
Total, real			0	291	124	

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)

Project:

Alternatief 3: Dubbele wolk

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17-03-2014 14:06 / 6

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Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

14-11-2013 12:36/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06	06:06 21:34	06:48 (39) 20:33	07:34 (35) 19:24	07:43 17:18	08:27 16:38
2	05:30 22:05	06:07 21:32	06:50 (39) 20:30	07:35 (35) 19:21	07:45 17:16	08:28 16:38
3	05:31 22:05	06:09 21:31	06:51 (39) 20:28	07:37 (35) 19:19	07:46 17:14	08:30 16:37
4	05:32 22:04	06:10 21:29	07:46 (35) 20:26	07:38 (35) 19:17	07:48 17:13	08:31 16:36
5	05:32 22:04	06:12 21:27	07:44 (35) 20:24	07:40 (35) 19:15	07:50 17:11	08:32 16:36
6	05:33 22:03	06:13 21:26	07:42 (35) 20:21	07:41 (35) 19:12	07:51 17:09	08:34 16:35
7	05:34 22:03	06:15 21:24	07:41 (35) 20:19	07:43 (35) 19:10	07:53 17:08	08:35 16:35
8	05:35 22:02	06:16 21:22	07:39 (35) 20:17	07:44 (35) 19:08	07:55 17:06	08:36 16:35
9	05:36 22:02	06:18 21:20	07:37 (35) 20:14	07:46 (35) 19:06	07:56 17:04	08:37 16:34
10	05:37 22:01	06:19 21:18	07:37 (35) 20:12	07:47 (35) 19:03	07:58 17:03	08:38 16:34
11	05:38 22:00	06:21 21:16	07:35 (35) 20:10	07:49 (38) 19:01	08:00 17:01	08:39 16:34
12	05:39 21:59	06:23 21:15	07:35 (35) 20:08	07:51 (38) 18:59	08:02 17:00	08:40 16:34
13	05:40 21:58	06:24 21:13	07:33 (35) 20:05	08:03 18:57	08:03 16:58	08:41 16:34
14	05:41 21:58	06:26 21:11	07:33 (35) 20:03	08:05 18:55	08:05 16:57	08:42 16:34
15	05:42 21:57	06:27 21:09	07:32 (35) 20:01	08:07 18:52	08:07 16:55	08:43 16:34
16	05:44 21:56	06:29 21:07	07:32 (35) 19:58	08:08 18:50	08:08 16:54	08:44 16:34
17	05:45 21:54	06:31 21:05	07:31 (35) 19:56	08:10 18:48	08:05 16:52	08:45 16:34
18	05:46 21:53	06:32 (39) 21:03	07:31 (35) 19:54	08:12 18:46	08:06 16:51	08:46 16:35
19	05:47 21:52	06:36 (39) 21:01	07:30 (35) 19:51	08:13 18:44	08:08 16:50	08:46 16:35
20	05:49 21:51	06:34 (39) 20:59	07:30 (35) 19:49	08:15 18:42	08:10 16:49	08:47 16:35
21	05:50 21:50	06:34 (39) 20:56	07:29 (35) 19:47	08:17 18:40	08:11 16:48	08:48 16:36
22	05:51 21:49	06:35 (39) 20:54	07:29 (35) 19:44	08:19 18:38	08:13 16:46	08:48 16:36
23	05:53 21:47	06:36 (39) 20:52	07:28 (35) 19:42	08:20 18:36	08:15 16:45	08:49 16:37
24	05:54 21:46	06:38 (39) 20:50	07:28 (35) 19:40	08:22 18:34	08:16 16:44	08:49 16:37
25	05:55 21:45	06:39 (39) 20:48	07:28 (35) 19:37	08:24 17:32	08:18 16:43	08:50 16:38
26	05:57 21:43	06:40 (39) 20:46	07:28 (35) 19:35	08:26 17:30	08:19 16:42	08:50 16:39
27	05:58 21:42	06:42 (39) 20:44	07:27 (35) 19:33	08:27 17:28	08:21 16:41	08:50 16:39
28	06:00 21:40	06:43 (39) 20:41	07:28 (35) 19:31	08:29 17:26	08:22 16:41	08:50 16:40
29	06:01 21:39	06:44 (39) 20:39	07:29 (35) 19:28	08:31 17:24	08:24 16:40	08:50 16:41
30	06:03 21:37	06:46 (39) 20:37	07:31 (35) 19:26	08:33 17:22	08:25 16:39	08:51 16:42
31	06:04 21:36	06:47 (39) 20:35	07:32 (35) 19:24	08:35 17:20	08:26 16:38	08:51 16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case	144	1327	295			
Sun reduction	0,40	0,42	0,36			
Oper. time red.	0,97	0,97	0,97			
Wind dir. red.	0,67	0,62	0,61			
Total reduction	0,26	0,25	0,21			
Total, real	37	335	63			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk

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17-03-2014 14:06 / 22

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

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Calculated:

14-11-2013 12:36/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: U - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (21)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March		April		May	June	July	August	September		October	November	December	
1	08:51	08:24	07:31		07:21	07:57 (34)	06:17	05:32	05:29	06:06	06:55		07:43	07:36	08:27	
	16:44	17:31	18:23		20:16	07:58 (34)	21:06	21:52	22:06	21:34	20:33		19:24	17:18	16:38	
2	08:51	08:23	07:29		07:19	07:54 (34)	06:15	05:32	05:30	06:07	06:56		07:45	07:38	08:28	
	16:45	17:33	18:24		20:18	07:57 (34)	21:08	21:53	22:05	21:33	20:30		19:21	17:16	16:38	
3	08:51	08:21	07:27		07:17	07:52 (34)	06:13	05:31	05:31	06:09	06:58		07:46	07:40	08:30	
	16:46	17:35	18:26		20:19	07:56 (34)	21:10	21:54	22:05	21:31	20:28		19:19	17:15	16:37	
4	08:50	08:20	07:25		07:15	07:50 (34)	06:11	05:30	05:32	06:10	07:00		07:48	07:42	08:31	
	16:47	17:37	18:28		20:21	07:55 (34)	21:11	21:55	22:04	21:29	20:26		19:17	17:13	16:36	
5	08:50	08:18	07:23		07:12	07:48 (34)	06:10	05:29	05:32	06:12	07:01		07:50	07:44	08:32	
	16:49	17:39	18:30		20:23	07:54 (34)	21:13	21:56	22:04	21:27	20:24		19:15	17:11	16:36	
6	08:50	08:16	07:20		07:10	07:46 (34)	06:08	05:29	05:33	06:13	07:03	07:41 (34)	07:51	07:45	08:34	
	16:50	17:41	18:31		20:24	07:51 (34)	21:15	21:57	22:04	21:26	20:21	07:46 (34)	19:12	17:09	16:36	
7	08:49	08:15	07:18		07:08		06:06	05:28	05:34	06:15	07:04	07:43 (34)	07:53	07:47	08:35	
	16:51	17:42	18:33		20:26		21:16	21:58	22:03	21:24	20:19	07:49 (34)	19:10	17:08	16:35	
8	08:49	08:13	07:16		07:06		06:04	05:28	05:35	06:16	07:06	07:44 (34)	07:55	07:49	08:36	
	16:52	17:44	18:35		20:28		21:18	21:59	22:02	21:22	20:17	07:49 (34)	19:08	17:06	16:35	
9	08:48	08:11	07:14		07:03		06:03	05:27	05:36	06:18	07:08	07:46 (34)	07:57	07:51	08:37	
	16:54	17:46	18:37		20:30		21:19	21:59	22:02	21:20	20:15	07:50 (34)	19:06	17:04	16:35	
10	08:48	08:09	07:12		07:01		06:01	05:27	05:37	06:19	07:09	07:47 (34)	07:58	07:52	08:38	
	16:55	17:48	18:38		20:31		21:21	22:00	22:01	21:18	20:12	07:50 (34)	19:03	17:03	16:34	
11	08:47	08:08	07:09		06:59		05:59	05:26	05:38	06:21	07:11	07:49 (34)	08:00	07:54	08:40	
	16:56	17:50	18:40		20:33		21:23	22:01	22:00	21:16	20:10	07:51 (34)	19:01	17:01	16:34	
12	08:47	08:06	07:07		06:57		05:58	05:26	05:39	06:23	07:12	08:04 (33)	08:02	07:56	08:41	
	16:58	17:52	18:42		20:35		21:24	22:02	21:59	21:15	20:08	08:10 (33)	18:59	17:00	16:34	
13	08:46	08:04	07:05		06:54		05:56	05:26	05:40	06:24	07:14	08:00 (33)	08:03	07:58	08:42	
	16:59	17:54	18:44		20:36		21:26	22:02	21:58	21:13	20:05	08:13 (33)	18:57	16:58	16:34	
14	08:45	08:02	07:03		06:52		05:54	05:25	05:41	06:26	07:16	07:58 (33)	08:05	07:59	08:42	
	17:01	17:55	18:45		20:38		21:27	22:03	21:58	21:11	20:03	08:15 (33)	18:55	16:57	16:34	
15	08:45	08:00	07:00		06:50		05:53	05:25	05:42	06:27	07:17	07:55 (33)	08:07	08:01	08:43	
	17:02	17:57	18:47		20:40		21:29	22:04	21:57	21:09	20:01	08:16 (33)	18:52	16:55	16:34	
16	08:44	07:58	06:58		06:48		05:51	05:25	05:44	06:29	07:19	07:57 (33)	08:08	08:03	08:44	
	17:04	17:59	18:49		20:41		21:30	22:04	21:56	21:07	19:58	08:17 (33)	18:50	16:54	16:34	
17	08:43	07:56	06:56		06:46		05:50	05:25	05:45	06:31	07:20	07:58 (33)	08:10	08:05	08:45	
	17:06	18:01	18:51		20:43		21:32	22:04	21:55	21:05	19:56	08:17 (33)	18:48	16:53	16:34	
18	08:42	07:54	06:53		06:44		05:48	05:25	05:46	06:32	07:22	08:00 (33)	08:12	08:06	08:46	
	17:07	18:03	18:52		20:45		21:33	22:05	21:53	21:03	19:54	08:17 (33)	18:46	16:51	16:35	
19	08:41	07:52	06:51	07:27 (33)	06:41		05:47	05:25	05:47	06:34	07:24	08:02 (33)	08:14	08:08	08:46	
	17:09	18:05	18:54	07:31 (33)	20:46		21:35	22:05	21:52	21:01	19:51	08:17 (33)	18:44	16:50	16:35	
20	08:40	07:50	06:49	07:24 (33)	06:39		05:46	05:25	05:49	06:35	07:25	08:03 (33)	08:15	08:10	08:47	
	17:10	18:06	18:56	07:30 (33)	20:48		21:36	22:06	21:51	20:59	19:49	08:17 (33)	18:42	16:49	16:35	
21	08:39	07:48	06:47	07:22 (33)	06:37		05:44	05:25	05:50	06:37	07:27	08:05 (33)	08:17	08:11	08:48	
	17:12	18:08	18:57	07:31 (33)	20:50		21:38	22:06	21:50	20:56	19:47	08:17 (33)	18:40	16:48	16:36	
22	08:38	07:46	06:44	07:20 (33)	06:35		05:43	05:26	05:51	06:39	07:29	08:06 (33)	08:19	08:13	08:48	
	17:14	18:10	18:59	07:31 (33)	20:51		21:39	22:06	21:49	20:54	19:44	08:15 (33)	18:38	16:46	16:36	
23	08:37	07:44	06:42	07:17 (33)	06:33		05:42	05:26	05:53	06:40	07:30	08:08 (33)	08:21	08:15	08:49	
	17:16	18:12	19:01	07:30 (33)	20:53		21:40	22:06	21:47	20:52	19:42	08:15 (33)	18:36	16:45	16:37	
24	08:35	07:42	06:40	07:15 (33)	06:31		05:41	05:26	05:54	06:42	07:32	08:10 (33)	08:22	08:16	08:49	
	17:17	18:14	19:03	07:30 (33)	20:55		21:42	22:06	21:46	20:50	19:40	08:14 (33)	18:34	16:44	16:37	
25	08:34	07:40	06:37	07:13 (33)	06:29		05:39	05:26	05:55	06:43	07:33	08:11 (33)	07:24	08:18	08:50	
	17:19	18:15	19:04	07:30 (33)	20:56		21:43	22:06	21:45	20:48	19:38	08:12 (33)	17:32	16:43	16:38	
26	08:33	07:38	06:35	07:10 (33)	06:27		05:38	05:27	05:57	06:45	07:35		07:26	08:19	08:50	
	17:21	18:17	19:06	07:28 (33)	20:58		21:44	22:06	21:43	20:46	19:35		17:30	16:42	16:39	
27	08:31	07:36	06:33	07:08 (33)	06:25		05:37	05:27	05:58	06:47	07:37		07:28	08:21	08:50	
	17:22	18:19	19:08	07:27 (33)	21:00		21:46	22:06	21:42	20:44	19:33		17:28	16:41	16:39	
28	08:30	07:34	06:31	07:06 (33)	06:23		05:36	05:28	06:00	06:48	07:38		07:29	08:23	08:50	
	17:24	18:21	19:09	07:26 (33)	21:01		21:47	22:06	21:40	20:42	19:31		17:26	16:41	16:40	
29	08:29		07:28	08:07 (33)	06:21		05:35	05:28	06:01	06:50	07:40		07:31	08:24	08:51	
	17:26		20:11	08:25 (33)	21:03		21:48	22:06	21:39	20:39	19:28		17:24	16:40	16:41	
30	08:27		07:26	08:08 (33)	06:19		05:34	05:29	06:03	06:52	07:42		07:33	08:25	08:51	
	17:28		20:13	08:22 (33)	21:05		21:49	22:06	21:37	20:37	19:26		17:22	16:39	16:42	
31	08:26		07:24	08:11 (33)			05:33		06:04	06:53			07:35		08:51	
	17:30		20:14	08:18 (33)			21:51		21:36	20:35			17:20		16:43	
Potential sun hours	260	278	367		416		484	497	501		453		381	332	267	245
Total, worst case			171			25						201				
Sun reduction			0,30			0,38						0,36				
Oper. time red.			0,97			0,97						0,97				
Wind dir. red.			0,59			0,61						0,59				
Total reduction			0,17			0,23						0,21				
Total, real			30			6						42				

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)

Project:

Alternatief 4: Grote wolk

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17-03-2014 14:13 / 5

Licensed user:

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Van Twickelostraat 2

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Calculated:

14-11-2013 12:49/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: -180,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:58 (44)	08:24	09:27 (46)	07:31	08:19 (45)	07:21	07:57 (38)	06:17	07:33 (35)	05:32
	16:44	60	13:26 (41)	17:31	11:36 (42)	18:23	11:33 (42)	20:16	07:59 (38)	21:06	08:33 (35)	21:52
2	08:51		09:59 (44)	08:23	09:30 (46)	07:29	08:19 (45)	07:19	07:54 (38)	06:15	07:33 (35)	05:31
	16:45	57	13:26 (41)	17:33	11:37 (42)	18:24	11:32 (42)	20:18	08:02 (38)	21:08	08:33 (35)	21:53
3	08:50		10:00 (44)	08:21	10:25 (42)	07:27	08:20 (45)	07:17	07:52 (38)	06:13	07:33 (35)	05:31
	16:46	55	13:26 (41)	17:35	11:37 (42)	18:26	11:30 (42)	20:19	08:04 (38)	21:10	08:32 (35)	21:54
4	08:50		09:59 (44)	08:20	10:24 (42)	07:25	08:19 (45)	07:14	07:50 (38)	06:11	07:33 (35)	05:30
	16:47	54	13:25 (41)	17:37	11:38 (42)	18:28	11:28 (42)	20:21	08:06 (38)	21:11	08:33 (35)	21:55
5	08:50		10:00 (44)	08:18	10:25 (42)	07:23	08:19 (45)	07:12	07:48 (38)	06:10	07:33 (35)	05:29
	16:49	51	13:24 (41)	17:39	11:39 (42)	18:30	11:26 (42)	20:23	08:07 (38)	21:13	08:32 (35)	21:56
6	08:50		10:00 (44)	08:16	10:24 (42)	07:20	08:20 (45)	07:10	07:45 (38)	06:08	07:32 (35)	05:29
	16:50	47	13:22 (41)	17:41	11:40 (42)	18:31	11:24 (42)	20:24	08:07 (38)	21:15	08:32 (35)	21:57
7	08:49		10:01 (44)	08:15	10:24 (42)	07:18	08:21 (45)	07:08	07:43 (38)	06:06	07:33 (35)	05:28
	16:51	40	10:41 (44)	17:42	11:40 (42)	18:33	11:21 (42)	20:26	08:07 (38)	21:16	08:32 (35)	21:58
8	08:49		10:01 (44)	08:13	10:23 (42)	07:16	07:52 (47)	07:05	07:41 (38)	06:04	07:33 (35)	05:28
	16:52	40	10:41 (44)	17:44	11:41 (42)	18:35	11:18 (42)	20:28	08:08 (38)	21:18	08:31 (35)	21:59
9	08:48		10:01 (44)	08:11	10:23 (42)	07:14	07:50 (47)	07:03	07:39 (38)	06:03	07:34 (35)	05:27
	16:54	40	10:41 (44)	17:46	11:41 (42)	18:37	11:15 (42)	20:29	08:08 (38)	21:19	08:31 (35)	21:59
10	08:48		10:01 (44)	08:09	10:23 (42)	07:12	07:48 (47)	07:01	07:37 (48)	06:01	06:40 (39)	05:27
	16:55	40	10:41 (44)	17:48	11:41 (42)	18:38	11:11 (42)	20:31	08:08 (38)	21:21	08:30 (35)	22:00
11	08:47		10:02 (44)	08:07	10:22 (42)	07:09	07:45 (47)	06:59	07:35 (48)	05:59	06:39 (39)	05:26
	16:56	47	10:58 (42)	17:50	11:42 (42)	18:40	11:04 (42)	20:33	08:11 (35)	21:23	08:30 (35)	22:01
12	08:47		09:34 (46)	08:06	10:22 (42)	07:07	07:43 (47)	06:57	07:32 (48)	05:58	06:37 (39)	05:26
	16:58	59	11:04 (42)	17:52	11:42 (42)	18:42	08:38 (45)	20:35	08:17 (35)	21:24	08:29 (35)	22:02
13	08:46		09:33 (46)	08:04	10:22 (42)	07:05	07:41 (47)	06:54	07:30 (48)	05:56	06:36 (39)	05:26
	16:59	66	11:07 (42)	17:54	11:42 (42)	18:44	07:59 (47)	20:36	08:21 (35)	21:26	08:29 (35)	22:02
14	08:45		09:32 (46)	08:02	10:22 (42)	07:03	07:38 (47)	06:52	07:28 (48)	05:54	06:34 (39)	05:25
	17:01	73	11:10 (42)	17:55	11:42 (42)	18:45	07:58 (47)	20:38	08:23 (35)	21:27	08:28 (35)	22:03
15	08:44		09:31 (46)	08:00	10:22 (42)	07:00	07:36 (47)	06:50	07:26 (48)	05:53	06:33 (39)	05:25
	17:02	76	11:12 (42)	17:57	11:42 (42)	18:47	07:58 (47)	20:40	08:25 (35)	21:29	08:28 (35)	22:03
16	08:44		09:29 (46)	07:58	10:22 (42)	06:58	07:36 (47)	06:48	07:25 (48)	05:51	06:32 (39)	05:25
	17:04	80	11:13 (42)	17:59	11:42 (42)	18:49	07:58 (47)	20:41	08:27 (35)	21:30	08:27 (35)	22:04
17	08:43		09:28 (46)	07:56	10:22 (42)	06:56	07:36 (47)	06:46	07:26 (48)	05:50	06:30 (39)	05:25
	17:06	83	11:15 (42)	18:01	11:42 (42)	18:51	07:56 (47)	20:43	08:28 (35)	21:32	08:26 (35)	22:04
18	08:42		09:27 (46)	07:54	08:34 (45)	06:53	07:37 (47)	06:44	07:29 (48)	05:48	06:29 (39)	05:25
	17:07	87	11:18 (42)	18:03	11:41 (42)	18:52	07:55 (47)	20:45	08:29 (35)	21:33	08:25 (35)	22:05
19	08:41		09:26 (46)	07:52	08:30 (45)	06:51	07:39 (47)	06:41	07:42 (35)	05:47	06:28 (39)	05:25
	17:09	91	11:20 (42)	18:05	11:41 (42)	18:54	07:53 (47)	20:46	08:30 (35)	21:35	08:25 (35)	22:05
20	08:40		09:25 (46)	07:50	08:28 (45)	06:49	07:40 (47)	06:39	07:41 (35)	05:46	06:27 (39)	05:25
	17:10	94	11:22 (42)	18:06	11:41 (42)	18:56	07:50 (47)	20:48	08:31 (35)	21:36	08:24 (35)	22:05
21	08:39		09:23 (46)	07:48	08:26 (45)	06:47		06:37	07:40 (35)	05:44	06:26 (39)	05:25
	17:12	95	11:22 (42)	18:08	11:41 (42)	18:57		06:35	08:32 (35)	21:38	08:24 (35)	22:06
22	08:38		09:22 (46)	07:46	08:25 (45)	06:44		06:35	07:39 (35)	05:43	06:25 (39)	05:26
	17:14	98	11:24 (42)	18:10	11:40 (42)	18:59		06:33	08:32 (35)	21:39	08:23 (35)	22:06
23	08:36		09:20 (46)	07:44	08:24 (45)	06:42		06:33	07:38 (35)	05:42	06:24 (39)	05:26
	17:15	101	11:25 (42)	18:12	11:40 (42)	19:01		06:31	08:32 (35)	21:40	08:22 (35)	22:06
24	08:35		09:19 (46)	07:42	08:22 (45)	06:40		06:31	07:37 (35)	05:40	06:23 (39)	05:26
	17:17	102	11:27 (42)	18:14	11:38 (42)	19:02		06:29	08:33 (35)	21:42	08:21 (35)	22:06
25	08:34		09:19 (46)	07:40	08:21 (45)	06:37		06:29	07:36 (35)	05:39	06:24 (39)	05:26
	17:19	103	11:28 (42)	18:15	11:38 (42)	19:04		06:27	08:33 (35)	21:43	08:21 (35)	22:06
26	08:33		09:20 (46)	07:38	08:21 (45)	06:35		06:27	07:35 (35)	05:38	06:25 (39)	05:27
	17:21	102	11:30 (42)	18:17	11:37 (42)	19:06		06:25	08:33 (35)	21:44	08:20 (35)	22:06
27	08:31		09:21 (46)	07:36	08:20 (45)	06:33		06:25	07:35 (35)	05:37	06:25 (39)	05:27
	17:22	101	11:30 (42)	18:19	11:36 (42)	19:08		06:23	08:33 (35)	21:46	08:19 (35)	22:06
28	08:30		09:22 (46)	07:33	08:19 (45)	06:30		06:23	07:34 (35)	05:36	06:25 (39)	05:28
	17:24	100	11:32 (42)	18:21	11:34 (42)	19:09		06:21	08:33 (35)	21:47	08:18 (35)	22:06
29	08:29		09:23 (46)			07:28		06:21	07:35 (35)	05:35	06:25 (39)	05:28
	17:26	98	11:33 (42)			20:11		06:19	08:34 (35)	21:48	08:16 (35)	22:06
30	08:27		09:23 (46)			07:26		06:19	07:34 (35)	05:34	06:26 (39)	05:29
	17:28	97	11:34 (42)			20:13		06:19	08:34 (35)	21:49	08:15 (35)	22:06
31	08:26		09:26 (46)			07:24				05:33	06:26 (39)	
	17:30	92	11:35 (42)			20:14				21:51	08:14 (35)	
Potential sun hours	260			278		367		416		484		497
Total, worst case	2329			2459		1086		1275		1917		274
Sun reduction	0,18			0,27		0,30		0,38		0,43		0,38
Oper. time red.	0,99			0,99		0,99		0,99		0,99		0,99
Wind dir. red.	0,60			0,60		0,58		0,61		0,63		0,65
Total reduction	0,11			0,16		0,17		0,23		0,26		0,24
Total, real	253			392		188		296		506		67

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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Project:

Alternatief 4: Grote wolk

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17-03-2014 14:13 / 6

Licensed user:

Witteveen+Bos

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Calculated:

14-11-2013 12:49/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: -180,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29	06:39 (39)	06:06	06:48 (39)	06:55	07:34 (48)	07:43	08:21 (47)	07:36	09:52 (42)	08:27	09:44 (44)
2	22:06	06:47 (39)	21:34	06:40 (39)	20:33	08:09 (35)	19:24	08:38 (47)	17:18	11:11 (42)	16:38	10:41 (42)
3	05:31	06:39 (39)	21:32	06:51 (39)	06:58	07:35 (48)	07:45	08:23 (47)	07:38	09:53 (42)	08:28	09:44 (44)
4	22:05	06:49 (39)	21:32	06:51 (39)	20:30	08:06 (38)	19:21	11:40 (42)	17:16	11:11 (42)	16:38	10:24 (44)
5	05:32	06:38 (39)	21:31	06:51 (39)	06:58	07:37 (38)	07:46	08:25 (47)	07:40	09:53 (42)	08:30	09:45 (44)
6	22:05	06:50 (39)	21:31	08:41 (35)	20:28	08:06 (38)	19:19	11:46 (42)	17:14	11:10 (42)	16:37	10:25 (44)
7	05:32	06:37 (39)	21:30	07:43 (35)	07:00	07:38 (38)	07:48	08:26 (47)	07:42	09:53 (42)	08:31	09:45 (44)
8	22:04	06:50 (39)	21:29	08:41 (35)	20:26	08:05 (38)	19:17	11:50 (42)	17:13	11:10 (42)	16:36	10:25 (44)
9	05:32	06:37 (39)	21:27	07:43 (35)	07:01	07:40 (38)	07:50	08:28 (47)	07:43	09:54 (42)	08:32	09:46 (44)
10	22:04	06:51 (39)	21:27	08:42 (35)	20:24	08:04 (38)	19:15	11:53 (42)	17:11	11:09 (42)	16:36	10:26 (44)
11	05:33	06:37 (39)	21:26	07:43 (35)	07:03	07:41 (38)	07:51	08:30 (47)	07:45	09:54 (42)	08:34	09:46 (44)
12	22:03	06:52 (39)	21:26	08:41 (35)	20:21	08:03 (38)	19:12	11:56 (42)	17:09	11:09 (42)	16:35	13:08 (41)
13	05:34	06:37 (39)	21:25	07:43 (35)	07:04	07:43 (38)	07:53	08:57 (45)	07:47	09:55 (42)	08:35	09:46 (44)
14	22:03	08:10 (35)	21:24	08:42 (35)	20:19	08:02 (38)	19:10	11:59 (42)	17:08	11:08 (42)	16:35	13:10 (41)
15	05:35	06:35 (39)	21:22	07:42 (35)	07:06	07:44 (38)	07:55	08:55 (45)	07:49	09:56 (42)	08:36	09:48 (44)
16	22:02	08:14 (35)	21:22	08:42 (35)	20:17	08:00 (38)	19:08	12:00 (42)	17:06	11:08 (42)	16:35	13:13 (41)
17	05:36	06:35 (39)	21:21	07:42 (35)	07:08	07:46 (38)	07:56	08:54 (45)	07:51	09:01 (46)	08:37	09:48 (44)
18	22:02	08:16 (35)	21:20	08:41 (35)	20:14	07:59 (38)	19:06	12:02 (42)	17:04	11:07 (42)	16:34	13:14 (41)
19	05:37	06:35 (39)	21:19	07:42 (35)	07:09	07:47 (38)	07:58	08:54 (45)	07:52	08:58 (46)	08:38	09:48 (44)
20	22:01	08:18 (35)	21:18	08:42 (35)	20:12	07:56 (38)	19:03	12:03 (42)	17:03	11:07 (42)	16:34	13:15 (41)
21	05:38	06:35 (39)	21:17	07:42 (35)	07:11	07:49 (38)	08:00	08:54 (45)	07:54	08:56 (46)	08:39	09:49 (44)
22	22:00	08:20 (35)	21:16	08:41 (35)	20:10	07:52 (38)	19:01	12:05 (42)	17:01	11:06 (42)	16:34	13:17 (41)
23	05:39	06:34 (39)	21:15	07:42 (35)	07:12	08:02	19:02	08:52 (45)	07:56	08:55 (46)	08:40	09:50 (44)
24	21:59	08:22 (35)	21:15	08:42 (35)	20:08	18:59	102	12:05 (42)	17:00	11:05 (42)	16:34	13:18 (41)
25	05:40	06:34 (39)	21:14	07:42 (35)	07:14	08:03	102	08:52 (45)	07:58	08:54 (46)	08:41	09:50 (44)
26	21:58	08:23 (35)	21:13	08:41 (35)	20:05	18:57	104	12:06 (42)	16:58	11:05 (42)	16:34	13:19 (41)
27	05:41	06:34 (39)	21:12	07:42 (35)	07:16	08:05	106	08:52 (45)	07:59	08:54 (46)	08:42	09:51 (44)
28	21:58	08:24 (35)	21:11	08:41 (35)	20:03	18:55	106	12:08 (42)	16:57	11:04 (42)	16:34	13:20 (41)
29	05:42	06:34 (39)	21:10	07:42 (35)	07:17	08:07	106	08:53 (45)	08:01	08:54 (46)	08:43	09:52 (44)
30	21:57	08:26 (35)	21:09	08:40 (35)	20:01	18:52	106	12:08 (42)	16:55	11:03 (42)	16:34	13:21 (41)
31	05:44	06:33 (39)	21:08	07:42 (35)	07:19	08:08	106	08:53 (45)	08:03	08:53 (46)	08:44	09:51 (44)
32	21:56	08:27 (35)	21:07	08:41 (35)	19:58	18:50	107	12:09 (42)	16:54	11:03 (42)	16:34	13:21 (41)
33	05:45	06:33 (39)	21:06	07:42 (35)	07:20	08:10	107	08:54 (45)	08:05	08:53 (46)	08:45	09:52 (44)
34	21:54	08:28 (35)	21:05	08:40 (35)	19:56	18:48	106	12:10 (42)	16:52	11:02 (42)	16:34	13:22 (41)
35	05:46	06:34 (39)	21:04	07:43 (35)	07:22	08:12	106	08:54 (45)	08:06	08:53 (46)	08:46	09:53 (44)
36	21:53	08:30 (35)	21:03	08:40 (35)	19:54	18:46	108	12:11 (42)	16:51	11:01 (42)	16:35	13:23 (41)
37	05:47	06:34 (39)	21:02	07:43 (35)	07:24	08:13	108	08:54 (45)	08:08	08:55 (46)	08:46	09:54 (44)
38	21:52	08:31 (35)	21:01	08:38 (35)	19:51	18:44	106	12:10 (42)	16:50	11:00 (42)	16:35	13:24 (41)
39	05:49	06:34 (39)	21:00	07:44 (35)	07:25	08:15	105	08:55 (45)	08:10	08:57 (46)	08:47	09:53 (44)
40	21:51	08:31 (35)	20:59	08:38 (35)	19:49	18:42	105	12:11 (42)	16:49	10:59 (42)	16:35	13:24 (41)
41	05:50	06:34 (39)	20:58	07:44 (35)	07:27	08:17	102	08:57 (45)	08:11	08:59 (46)	08:48	09:54 (44)
42	21:50	08:32 (35)	20:56	08:37 (35)	19:47	18:40	102	12:11 (42)	16:48	10:59 (42)	16:36	13:25 (41)
43	05:51	06:35 (39)	20:55	07:45 (35)	07:28	08:19	98	08:59 (45)	08:13	09:01 (46)	08:48	09:54 (44)
44	21:49	08:33 (35)	20:54	08:36 (35)	19:44	18:38	98	12:11 (42)	16:46	10:58 (42)	16:36	13:25 (41)
45	05:53	06:36 (39)	20:53	07:45 (35)	07:30	08:20	94	09:01 (45)	08:15	09:02 (46)	08:49	09:55 (44)
46	21:47	08:34 (35)	20:52	08:35 (35)	19:42	08:33 (47)	18:36	12:12 (42)	16:45	10:56 (42)	16:37	13:26 (41)
47	05:54	06:38 (39)	20:51	07:46 (35)	07:32	08:23 (47)	08:22	09:06 (45)	08:16	09:04 (46)	08:49	09:56 (44)
48	21:46	08:35 (35)	20:50	08:34 (35)	19:40	08:36 (47)	18:34	12:12 (42)	16:44	10:55 (42)	16:37	13:26 (41)
49	05:55	06:39 (39)	20:49	07:31 (48)	07:33	08:20 (47)	07:24	09:51 (42)	08:18	09:06 (46)	08:50	09:56 (44)
50	21:45	08:36 (35)	20:48	08:32 (35)	19:37	08:37 (47)	17:32	11:12 (42)	16:43	10:54 (42)	16:38	13:26 (41)
51	05:57	06:40 (39)	20:47	07:29 (48)	07:35	08:19 (47)	07:26	09:51 (42)	08:19	09:08 (46)	08:50	09:57 (44)
52	21:43	08:36 (35)	20:46	08:31 (35)	19:35	08:38 (47)	17:30	11:12 (42)	16:42	10:52 (42)	16:39	13:27 (41)
53	05:58	06:42 (39)	20:45	07:27 (48)	07:37	08:18 (47)	07:27	09:51 (42)	08:21	09:10 (46)	08:50	09:57 (44)
54	21:42	08:38 (35)	20:44	08:28 (35)	19:33	08:39 (47)	17:28	11:12 (42)	16:41	10:51 (42)	16:39	13:27 (41)
55	06:00	06:43 (39)	20:43	07:28 (48)	07:38	08:17 (47)	07:29	09:51 (42)	08:22	09:11 (46)	08:50	09:57 (44)
56	21:40	08:38 (35)	20:41	08:27 (35)	19:31	08:39 (47)	17:26	11:12 (42)	16:41	10:49 (42)	16:40	13:27 (41)
57	06:01	06:44 (39)	20:40	07:29 (48)	07:40	08:18 (47)	07:31	09:52 (42)	08:24	09:13 (46)	08:50	09:58 (44)
58	21:39	08:38 (35)	20:39	08:24 (35)	19:28	08:39 (47)	17:24	11:12 (42)	16:40	10:47 (42)	16:41	13:27 (41)
59	06:03	06:46 (39)	20:38	07:31 (48)	07:41	08:20 (47)	07:33	09:52 (42)	08:25	09:15 (46)	08:51	09:58 (44)
60	21:37	08:39 (35)	20:37	08:21 (35)	19:26	08:39 (47)	17:22	11:11 (42)	16:39	10:45 (42)	16:42	13:27 (41)
61	06:04	06:47 (39)	20:36	07:32 (48)	07:42	07:35	17:20	09:52 (42)	08:26	08:51	09:59 (44)	
62	21:36	08:40 (35)	20:35	08:17 (35)	19:25	07:35	17:19	11:11 (42)	16:38	10:44 (42)	16:43	13:27 (41)
Potential sun hours	501	453	381	367	2690	332	267	2573	1791			
Total, worst case	1485	1762	367	0,36	0,31	0,22	0,16	0,09	0,09	0,09	0,09	0,09
Sun reduction	0,40	0,42	0,36	0,31	0,22	0,16	0,09	0,09	0,09	0,09	0,09	0,09
Oper. time red.	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99	0,99
Wind dir. red.	0,64	0,62	0,59	0,60	0,60	0,60	0,60	0,60	0,60	0,60	0,60	0,60
Total reduction	0,25	0,26	0,21	0,18	0,18	0,13	0,10	0,10	0,10	0,10	0,10	0,10
Total, real	368	450	77	481	332	267	2573	1791				

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)

Project:

Alternatief 4: Grote wolk

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Licensed user:

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Calculated:

14-11-2013 12:49/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: U - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (21)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51	09:40 (41)	08:24	07:21	07:57 (34)	06:17
	16:44	2 09:41 (41)	17:31	20:16	33 08:35 (33)	21:06
2	08:51	09:40 (41)	08:23	07:19	07:54 (34)	06:15
	16:45	2 09:42 (41)	17:33	20:18	34 08:33 (33)	21:08
3	08:51	09:40 (41)	08:21	07:17	07:52 (34)	06:13
	16:46	3 09:43 (41)	17:35	20:19	34 08:32 (33)	21:10
4	08:50	09:39 (41)	08:20	07:15	07:50 (34)	06:11
	16:47	4 09:43 (41)	17:37	20:21	34 08:31 (33)	21:11
5	08:50	09:39 (41)	08:18	07:12	07:48 (34)	06:10
	16:49	5 09:44 (41)	17:39	20:23	32 08:29 (33)	21:13
6	08:50	09:38 (41)	08:16	07:10	07:46 (34)	06:08
	16:50	6 09:44 (41)	17:41	20:24	29 08:26 (33)	21:15
7	08:49	09:38 (41)	08:15	07:08	07:43 (34)	06:06
	16:51	7 09:45 (41)	17:42	20:26	18 08:01 (34)	21:16
8	08:49	09:37 (41)	08:13	07:06	07:43 (34)	06:04
	16:52	8 09:45 (41)	17:44	20:28	17 08:00 (34)	21:18
9	08:48	09:36 (41)	08:11	07:03	07:44 (34)	06:03
	16:54	10 09:46 (41)	17:46	20:30	15 07:59 (34)	21:19
10	08:48	09:35 (41)	08:09	07:01	07:45 (34)	06:01
	16:55	11 09:46 (41)	17:48	20:31	12 07:57 (34)	21:21
11	08:47	09:35 (41)	08:08	06:59	07:48 (34)	05:59
	16:56	12 09:47 (41)	17:50	20:33	6 07:54 (34)	21:23
12	08:47	09:34 (41)	08:06	06:57		05:58
	16:58	13 09:47 (41)	17:52	20:35		21:24
13	08:46	09:33 (41)	08:04	06:54		05:56
	16:59	15 09:48 (41)	17:54	20:36		21:26
14	08:45	09:32 (41)	08:02	06:52		05:54
	17:01	16 09:48 (41)	17:55	20:38		21:27
15	08:45	09:31 (41)	08:00	06:50		05:53
	17:02	17 09:48 (41)	17:57	20:40		21:29
16	08:44	09:30 (41)	07:58	06:48		05:51
	17:04	18 09:48 (41)	17:59	20:41		21:30
17	08:43	09:29 (41)	07:56	06:46		05:50
	17:06	18 09:47 (41)	18:01	20:43		21:32
18	08:42	09:30 (41)	07:54	06:44		05:48
	17:07	17 09:47 (41)	18:03	20:45		21:33
19	08:41	09:31 (41)	07:52	06:41		05:47
	17:09	16 09:47 (41)	18:05	20:46		21:35
20	08:40	09:33 (41)	07:50	06:39		05:46
	17:10	14 09:47 (41)	18:06	7 07:31 (33)		21:36
21	08:39	09:34 (41)	07:48	06:37		05:44
	17:12	11 09:45 (41)	18:08	11 07:33 (33)		21:38
22	08:38	09:36 (41)	07:46	06:35		05:43
	17:14	8 09:44 (41)	18:10	15 07:35 (33)		21:39
23	08:37		07:44	06:33		05:42
	17:16		18:12	19 07:36 (33)		21:40
24	08:35		07:42	06:31		05:41
	17:17		18:14	22 07:37 (33)		21:42
25	08:34		07:40	06:29		05:39
	17:19		18:15	24 07:37 (33)		21:43
26	08:33		07:38	06:27		05:38
	17:21		18:17	27 07:37 (33)		21:44
27	08:31		07:36	06:25		05:37
	17:22		18:19	28 07:37 (33)		21:46
28	08:30		07:34	06:23		05:36
	17:24		18:21	29 07:37 (33)		21:47
29	08:29			06:21		05:35
	17:26			29 08:37 (33)		21:48
30	08:27			06:19		05:34
	17:28			29 08:36 (33)		21:49
31	08:26			07:24		05:33
	17:30			31 08:36 (33)		21:51
Potential sun hours	260	278	367	416	484	497
Total, worst case	233	124	271	264		
Sun reduction	0,18	0,27	0,30	0,38		
Oper. time red.	0,99	0,99	0,99	0,99		
Wind dir. red.	0,55	0,56	0,59	0,60		
Total reduction	0,10	0,15	0,17	0,23		
Total, real	23	18	47	60		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

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Calculated:

14-11-2013 13:07/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	
1	08:51	08:24	07:31	07:21	06:17	05:32	06:24 (2)
	16:44	17:31	18:23	20:16	21:06	21:52	5 06:29 (2)
2	08:51	08:23	07:29	07:19	06:15	05:31	06:21 (2)
	16:45	17:33	18:24	20:18	21:08	21:53	11 06:32 (2)
3	08:50	08:21	07:27	07:17	06:13	05:31	06:19 (2)
	16:46	17:35	18:26	20:19	21:10	21:54	15 06:34 (2)
4	08:50	08:20	07:25	07:14	06:11	05:30	06:19 (2)
	16:47	17:37	18:28	20:21	21:11	21:55	17 06:36 (2)
5	08:50	08:18	07:23	07:12	07:48 (4)	06:10	05:29 06:17 (2)
	16:49	17:39	18:30	20:23	7 07:55 (4)	21:13	21:56 19 06:36 (2)
6	08:50	08:16	07:20	07:10	07:45 (4)	06:08	05:29 06:13 (3)
	16:50	17:41	18:31	20:24	12 07:57 (4)	21:15	21:57 23 06:38 (2)
7	08:49	08:15	07:18	07:08	07:43 (4)	06:06	05:28 06:12 (3)
	16:51	17:42	18:33	20:26	16 07:59 (4)	21:16	21:58 25 06:38 (2)
8	08:49	08:13	07:16	07:05	07:41 (4)	06:04	05:28 06:12 (3)
	16:52	17:44	18:35	20:28	19 08:00 (4)	21:18	21:59 28 06:40 (2)
9	08:48	08:11	07:14	07:03	07:39 (4)	06:03	05:27 06:12 (3)
	16:54	17:46	18:37	20:29	22 08:01 (4)	21:19	21:59 29 06:41 (2)
10	08:48	08:09	07:12	07:01	07:37 (4)	06:01	05:27 06:11 (3)
	16:55	17:48	18:38	20:31	25 08:02 (4)	21:21	22:00 30 06:41 (2)
11	08:47	08:07	07:09	06:59	07:35 (4)	05:59	05:26 06:11 (3)
	16:56	17:50	18:40	20:33	28 08:03 (4)	21:23	22:01 31 06:42 (2)
12	08:47	08:06	07:07	06:57	07:32 (4)	05:58	05:26 06:11 (3)
	16:58	17:52	18:42	20:35	30 08:02 (4)	21:24	22:02 31 06:42 (2)
13	08:46	08:04	07:05	06:54	07:32 (4)	05:56	05:26 06:11 (3)
	16:59	17:54	18:44	20:36	30 08:02 (4)	21:26	22:02 32 06:43 (2)
14	08:45	08:02	07:03	06:52	07:32 (4)	05:54	05:25 06:11 (3)
	17:01	17:55	18:45	20:38	30 08:02 (4)	21:27	22:03 33 06:44 (2)
15	08:44	08:00	07:00	06:50	07:31 (4)	05:53	05:25 06:11 (3)
	17:02	17:57	18:47	20:40	31 08:02 (4)	21:29	22:03 33 06:44 (2)
16	08:44	07:58	06:58	06:48	07:31 (4)	05:51	05:25 06:11 (3)
	17:04	17:59	18:49	20:41	30 08:01 (4)	21:30	22:04 33 06:44 (2)
17	08:43	07:56	06:56	06:46	07:31 (4)	05:50	05:25 06:11 (3)
	17:06	18:01	18:51	20:43	30 08:01 (4)	21:32	22:04 34 06:45 (2)
18	08:42	07:54	06:53	06:44	07:32 (4)	05:48	05:25 06:11 (3)
	17:07	18:03	18:52	20:45	28 08:00 (4)	21:33	22:05 34 06:45 (2)
19	08:41	07:52	06:51	06:41	07:32 (4)	05:47	05:25 06:11 (3)
	17:09	18:05	18:54	20:46	28 08:00 (4)	21:35	22:05 34 06:45 (2)
20	08:40	07:50	06:49	06:39	07:32 (4)	05:46	05:25 06:11 (3)
	17:10	18:06	18:56	20:48	27 07:59 (4)	21:36	22:05 34 06:45 (2)
21	08:39	07:48	06:47	06:37	07:33 (4)	05:44	05:25 06:11 (3)
	17:12	18:08	18:57	20:50	24 07:57 (4)	21:38	22:06 35 06:46 (2)
22	08:38	07:46	06:44	06:35	07:34 (4)	05:43	05:26 06:11 (3)
	17:14	18:10	18:59	20:51	22 07:56 (4)	21:39	22:06 34 06:45 (2)
23	08:36	07:44	06:42	06:33	07:35 (4)	05:42	05:26 06:12 (3)
	17:15	18:12	19:01	20:53	19 07:54 (4)	21:40	22:06 34 06:46 (2)
24	08:35	07:42	06:40	06:31	07:37 (4)	05:40	05:26 06:12 (3)
	17:17	18:14	19:02	20:55	15 07:52 (4)	21:42	22:06 34 06:46 (2)
25	08:34	07:40	06:37	06:29	07:40 (4)	05:39	05:26 06:12 (3)
	17:19	18:15	19:04	20:56	8 07:48 (4)	21:43	22:06 34 06:46 (2)
26	08:33	07:38	06:35	06:27		05:38	05:27 06:13 (3)
	17:21	18:17	19:06	20:58		21:44	22:06 34 06:47 (2)
27	08:31	07:36	06:33	06:25		05:37	05:27 06:13 (3)
	17:22	18:19	19:08	21:00		21:46	22:06 33 06:46 (2)
28	08:30	07:33	06:30	06:23		05:36	05:28 06:14 (3)
	17:24	18:21	19:09	21:01		21:47	22:06 33 06:47 (2)
29	08:29		07:28	06:21		05:35	05:28 06:14 (3)
	17:26		20:11	21:03		21:48	22:06 32 06:46 (2)
30	08:27		07:26	06:19		05:34	05:29 06:15 (3)
	17:28		20:13	21:05		21:49	22:06 32 06:47 (2)
31	08:26		07:24			05:33	
	17:30		20:14			21:51	
Potential sun hours	260	278	367	416	484	497	
Total, worst case				481			866
Sun reduction				0,38			0,38
Oper. time red.				0,99			0,99
Wind dir. red.				0,62			0,68
Total reduction				0,23			0,26
Total, real				112			223

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)
	Minutes with flicker		

Project:

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Van Twickelostraat 2

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Calculated:

14-11-2013 13:07/2.7.490

Bos
Witteveen**SHADOW - Calendar****Shadow receptor:** E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 90,0° (5)**Assumptions for shadow calculations**

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29	06:15 (3)	06:06	06:55	07:34 (4)	07:43
	22:06	31 06:46 (2)	21:34	20:33	27 08:01 (4)	19:24
2	05:30	06:16 (3)	06:07	06:56	07:35 (4)	07:45
	22:05	30 06:46 (2)	21:32	20:30	25 08:00 (4)	19:21
3	05:31	06:17 (3)	06:09	06:58	07:37 (4)	07:46
	22:05	29 06:46 (2)	21:31	20:28	22 07:59 (4)	19:19
4	05:32	06:17 (3)	06:10	07:00	07:38 (4)	07:48
	22:04	28 06:45 (2)	21:29	20:26	19 07:57 (4)	19:17
5	05:32	06:18 (3)	06:12	07:01	07:40 (4)	07:50
	22:04	26 06:45 (2)	21:27	20:24	16 07:56 (4)	19:15
6	05:33	06:19 (3)	06:13	07:03	07:41 (4)	07:51
	22:03	24 06:45 (2)	21:26	20:21	12 07:53 (4)	19:12
7	05:34	06:20 (3)	06:15	07:04	07:43 (4)	07:53
	22:03	22 06:44 (2)	21:24	20:19	7 07:50 (4)	19:10
8	05:35	06:24 (2)	06:16	07:06	07:55	07:49
	22:02	19 06:43 (2)	21:22	20:17	19:08	17:06
9	05:36	06:26 (2)	06:18	07:08	07:56	07:51
	22:02	16 06:42 (2)	21:20	20:14	19:06	17:04
10	05:37	06:28 (2)	06:19	07:09	07:58	07:52
	22:01	12 06:40 (2)	21:18	20:12	19:03	17:03
11	05:38	06:30 (2)	06:21	07:11	08:00	07:54
	22:00	8 06:38 (2)	21:16	20:10	19:01	17:01
12	05:39	06:23	07:12	08:02	07:56	08:40
	21:59	21:15	20:08	18:59	17:00	16:34
13	05:40	06:24	07:14	08:03	07:58	08:41
	21:58	21:13	20:05	18:57	16:58	16:34
14	05:41	06:26	07:16	08:05	07:59	08:42
	21:58	21:11	20:03	18:55	16:57	16:34
15	05:42	06:27	07:17	08:07	08:01	08:43
	21:57	21:09	20:01	18:52	16:55	16:34
16	05:44	06:29	07:19	08:08	08:03	08:44
	21:56	21:07	19:58	18:50	16:54	16:34
17	05:45	06:31	07:20	08:10	08:05	08:45
	21:54	21:05	19:56	18:48	16:52	16:34
18	05:46	06:32	07:22	08:12	08:06	08:46
	21:53	21:03	10 07:56 (4)	19:54	18:46	16:51
19	05:47	06:34	07:24	08:13	08:08	08:46
	21:52	21:01	16 07:58 (4)	19:51	18:44	16:50
20	05:49	06:35	07:25	08:15	08:10	08:47
	21:51	20:59	19 08:00 (4)	19:49	18:42	16:49
21	05:50	06:37	07:27	08:17	08:11	08:48
	21:50	20:56	22 08:01 (4)	19:47	18:40	16:48
22	05:51	06:39	07:28	08:19	08:13	08:48
	21:49	20:54	24 08:02 (4)	19:44	18:38	16:46
23	05:53	06:40	07:30	08:20	08:15	08:49
	21:47	20:52	26 08:02 (4)	19:42	18:36	16:45
24	05:54	06:42	07:32	08:22	08:16	08:49
	21:46	20:50	27 08:03 (4)	19:40	18:34	16:44
25	05:55	06:43	07:33	08:24	08:18	08:50
	21:45	20:48	29 08:03 (4)	19:37	17:32	16:43
26	05:57	06:45	07:35	08:26	08:19	08:50
	21:43	20:46	30 08:04 (4)	19:35	17:30	16:42
27	05:58	06:47	07:37	08:27	08:21	08:50
	21:42	20:44	30 08:03 (4)	19:33	17:28	16:41
28	06:00	06:48	07:38	08:29	08:22	08:50
	21:40	20:41	31 08:04 (4)	19:31	17:26	16:40
29	06:01	06:50	07:40	08:31	08:24	08:50
	21:39	20:39	31 08:03 (4)	19:28	17:24	16:40
30	06:03	06:51	07:41	08:33	08:25	08:51
	21:37	20:37	30 08:03 (4)	19:26	17:22	16:39
31	06:04	06:53	07:42	08:35	08:27	08:51
	21:36	20:35	30 08:02 (4)	19:24	17:20	16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case	245	355	128			
Sun reduction	0,40	0,42	0,36			
Oper. time red.	0,99	0,99	0,99			
Wind dir. red.	0,68	0,62	0,62			
Total reduction	0,27	0,26	0,22			
Total, real	66	91	28			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

VKA

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Van Twickelostraat 2

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Calculated:

14-11-2013 13:07/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: P - Shadow Receptor: 0,1 × 0,1 Azimuth: -180,0° Slope: 90,0° (16)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:51	08:24	07:31	07:21	06:17	05:32	05:29	06:06	06:55	07:43	07:36	08:27
	16:44	17:31	18:23	20:16	21:06	21:52	22:06	21:34	20:33	19:24	17:18	16:38
2	08:51	08:23	07:29	07:19	06:15	05:32	05:30	06:07	06:56	07:45	07:38	08:28
	16:45	17:33	18:24	20:18	21:08	21:53	22:05	21:33	20:30	19:21	17:16	16:38
3	08:51	08:21	07:27	07:17	06:13	05:31	05:31	06:09	06:58	07:46	07:40	08:30
	16:46	17:35	18:26	20:19	21:10	21:54	22:05	21:31	20:28	19:19	17:15	16:37
4	08:50	08:20	07:25	07:15	06:11	05:30	05:32	06:10	07:00	07:48	07:42	08:31
	16:47	17:37	18:28	20:21	21:11	21:55	22:04	21:29	20:26	19:17	17:13	16:36
5	08:50	08:18	07:23	07:12	06:10	05:29	05:32	06:12	07:01	07:50	07:44	08:32
	16:49	17:39	18:30	20:23	21:13	21:56	22:04	21:27	20:24	19:15	17:11	16:36
6	08:50	08:16	07:20	07:10	06:08	05:29	05:33	06:13	07:03	07:51	07:45	08:34
	16:50	17:41	18:31	20:24	21:15	21:57	22:04	21:26	20:21	19:12	17:09	16:36
7	08:49	08:15	07:18	07:08	06:06	05:28	05:34	06:15	07:04	07:53	07:47	08:35
	16:51	17:42	18:33	20:26	21:16	21:58	22:03	21:24	20:19	19:10	17:08	16:35
8	08:49	08:13	07:16	07:06	06:04	05:28	05:35	06:16	07:06	07:55	07:49	08:36
	16:52	17:44	18:35	20:28	21:18	21:59	22:02	21:22	20:17	19:08	17:06	16:35
9	08:48	08:11	07:14	07:03	06:03	05:27	05:36	06:18	07:08	07:57	07:51	08:37
	16:54	17:46	18:37	20:30	21:19	21:59	22:02	21:20	20:15	19:06	17:04	16:35
10	08:48	08:09	07:12	07:01	06:01	05:27	05:37	06:19	07:09	07:58	07:52	08:38
	16:55	17:48	18:38	20:31	21:21	22:00	22:01	21:18	20:12	19:03	17:03	16:34
11	08:47	08:08	07:09	06:59	05:59	05:26	05:38	06:21	07:11	08:00	07:54	08:40
	16:56	17:50	18:40	20:33	21:23	22:01	22:00	21:16	20:10	19:01	17:01	16:34
12	08:47	08:06	07:07	06:57	05:58	05:26	05:39	06:23	07:12	08:02	07:56	08:41
	16:58	17:52	18:42	20:35	21:24	22:02	21:59	21:15	20:08	18:59	17:00	16:34
13	08:46	08:04	07:05	06:54	05:56	05:26	05:40	06:24	07:14	08:03	07:58	08:42
	16:59	17:54	18:44	20:36	21:26	22:02	21:58	21:13	20:05	18:57	16:58	16:34
14	08:45	08:02	07:03	06:52	05:54	05:25	05:41	06:26	07:16	08:05 (1)	07:59	08:42
	17:01	17:55	18:45	20:38	21:27	22:03	21:58	21:11	20:03	4 08:09 (1)	18:55	16:34
15	08:45	08:00	07:00	06:50	05:53	05:25	05:42	06:27	07:17	08:01 (1)	08:07	08:43
	17:02	17:57	18:47	20:40	21:29	22:04	21:57	21:09	20:01	11 08:12 (1)	18:52	16:34
16	08:44	07:58	06:58	06:48	05:51	05:25	05:44	06:29	07:19	07:59 (1)	08:08	08:44
	17:04	17:59	18:49	20:41	21:30	22:04	21:56	21:07	19:58	15 08:14 (1)	18:50	16:34
17	08:43	07:56	06:56	06:46	05:50	05:25	05:45	06:31	07:20	07:58 (1)	08:10	08:45
	17:06	18:01	18:51	20:43	21:32	22:04	21:55	21:05	19:56	16 08:14 (1)	18:48	16:34
18	08:42	07:54	06:53	06:44	05:48	05:25	05:46	06:32	07:22	08:00 (1)	08:12	08:46
	17:07	18:03	18:52	20:45	21:33	22:05	21:53	21:03	19:54	15 08:15 (1)	18:46	16:35
19	08:41	07:52	06:51	06:41	05:47	05:25	05:47	06:34	07:24	08:02 (1)	08:14	08:46
	17:09	18:05	18:54	20:46	21:35	22:05	21:52	21:01	19:51	13 08:15 (1)	18:44	16:35
20	08:40	07:50	06:49	07:24 (1)	06:39	05:46	05:25	05:49	06:35	08:03 (1)	08:15	08:10
	17:10	18:06	18:56	4 07:28 (1)	20:48	21:36	22:06	21:51	20:59	11 08:14 (1)	18:42	16:35
21	08:39	07:48	06:47	07:22 (1)	06:37	05:44	05:25	05:50	06:37	08:05 (1)	08:17	08:11
	17:12	18:08	18:57	6 07:28 (1)	20:50	21:38	22:06	21:50	20:56	9 08:14 (1)	18:40	16:36
22	08:38	07:46	06:44	07:20 (1)	06:35	05:43	05:26	05:51	06:39	08:06 (1)	08:19	08:13
	17:14	18:10	18:59	9 07:29 (1)	20:51	21:39	22:06	21:49	20:54	7 08:13 (1)	18:38	16:36
23	08:37	07:44	06:42	07:17 (1)	06:33	05:42	05:26	05:53	06:40	08:08 (1)	08:21	08:15
	17:16	18:12	19:01	11 07:28 (1)	20:53	21:40	22:06	21:47	20:52	4 08:12 (1)	18:36	16:37
24	08:35	07:42	06:40	07:15 (1)	06:31	05:41	05:26	05:54	06:42	08:10 (1)	08:22	08:16
	17:17	18:14	19:03	13 07:28 (1)	20:55	21:42	22:06	21:46	20:50	2 08:11 (1)	18:34	16:37
25	08:34	07:40	06:37	07:13 (1)	06:29	05:39	05:26	05:55	06:43	07:24	08:18	08:50
	17:19	18:15	19:04	14 07:27 (1)	20:56	21:43	22:06	21:45	20:48	17:32	16:43	16:38
26	08:33	07:38	06:35	07:10 (1)	06:27	05:38	05:27	05:57	06:45	07:26	08:19	08:50
	17:21	18:17	19:06	16 07:26 (1)	20:58	21:44	22:06	21:43	20:46	17:30	16:42	16:39
27	08:31	07:36	06:33	07:10 (1)	06:25	05:37	05:27	05:58	06:47	07:28	08:21	08:50
	17:22	18:19	19:08	15 07:25 (1)	21:00	21:46	22:06	21:42	20:44	17:28	16:41	16:39
28	08:30	07:34	06:31	07:11 (1)	06:23	05:36	05:28	06:00	06:48	07:29	08:23	08:50
	17:24	18:21	19:09	12 07:23 (1)	21:01	21:47	22:06	21:40	20:42	17:26	16:41	16:40
29	08:29		07:28	08:14 (1)	06:21	05:35	05:28	06:01	06:50	07:31	08:24	08:51
	17:26		20:11	6 08:20 (1)	21:03	21:48	22:06	21:39	20:39	17:24	16:40	16:41
30	08:27		07:26		06:19	05:34	05:29	06:03	06:52	07:33	08:25	08:51
	17:28		20:13		21:05	21:49	22:06	21:37	20:37	17:22	16:39	16:42
31	08:26		07:24			05:33		06:04	06:53	07:35		08:51
	17:30		20:14			21:51		21:36	20:35	17:20		16:43
Potential sun hours	260	278	367	416	484	497	501	453	381	332	267	245
Total, worst case			106						107			
Sun reduction			0,30						0,36			
Oper. time red.			0,99						0,99			
Wind dir. red.			0,59						0,59			
Total reduction			0,18						0,21			
Total, real			19						22			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational hours are calculated from WTGs in calculation and wind

distribution:

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:
Obstacles used in calculation

Eye height: 1,5 m
Grid resolution: 10 m



Scale 1:50.000

New WTG

Shadow receptor

WTGs

RD1				Row data/Description	WTG type			Shadow data				
	East	North	Z		Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1			[m]									[RPM]
1	68.816	409.067	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	69.196	409.079	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	69.575	409.090	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	69.955	409.102	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	70.335	409.113	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	70.715	409.125	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	71.095	409.137	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	71.475	409.148	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	68.821	408.544	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.201	408.555	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.581	408.567	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.960	408.578	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.340	408.590	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.720	408.602	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	71.100	408.613	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	71.480	408.625	0,0	Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	68.746	410.646	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
18	69.245	410.624	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
19	69.689	410.394	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
20	70.027	410.028	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
21	70.273	409.590	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
22	70.432	408.119	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
23	70.775	407.783	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
24	71.199	407.557	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1
25	71.630	407.346	0,0	REpower 6 M 6000 126.0 !O! hub: 11...	Yes	REpower	6 M-6.000	6.000	126,0	117,0	2.027	12,1

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Main Result

Shadow receptor-Input

RD1

No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case

Shadow, expected values

No.	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	256:38	278	2:23	48:03
B	503:19	223	4:18	113:02
C	334:40	297	1:50	63:45
D	509:15	253	4:36	111:07
E	29:31	92	0:36	6:13
F	61:09	144	0:47	12:15

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)	55:21	13:05
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)	52:55	12:32
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)	26:04	6:30
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)	9:03	2:15
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)	16:29	3:41
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)	67:33	16:09
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)	0:00	0:00
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)	104:31	25:30
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)	425:38	91:08
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)	157:13	28:53
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)	29:33	5:24
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)	6:47	1:16
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)	11:36	2:16
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)	73:48	11:33
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)	378:43	80:02
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)	161:22	30:06
17	REpower 6 M 6000 126.0 !O! hub: 117,0 m (59)	9:06	1:55
18	REpower 6 M 6000 126.0 !O! hub: 117,0 m (60)	0:00	0:00
19	REpower 6 M 6000 126.0 !O! hub: 117,0 m (61)	52:10	11:30
20	REpower 6 M 6000 126.0 !O! hub: 117,0 m (62)	16:31	2:39
21	REpower 6 M 6000 126.0 !O! hub: 117,0 m (63)	20:46	4:34
22	REpower 6 M 6000 126.0 !O! hub: 117,0 m (64)	33:42	4:41
23	REpower 6 M 6000 126.0 !O! hub: 117,0 m (65)	0:00	0:00
24	REpower 6 M 6000 126.0 !O! hub: 117,0 m (66)	0:00	0:00
25	REpower 6 M 6000 126.0 !O! hub: 117,0 m (67)	0:00	0:00

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Calculated:

21-11-2013 11:15/2.7.490

Witteveen+Bos

SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational hours are calculated from WTGs in calculation and wind

distribution:

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

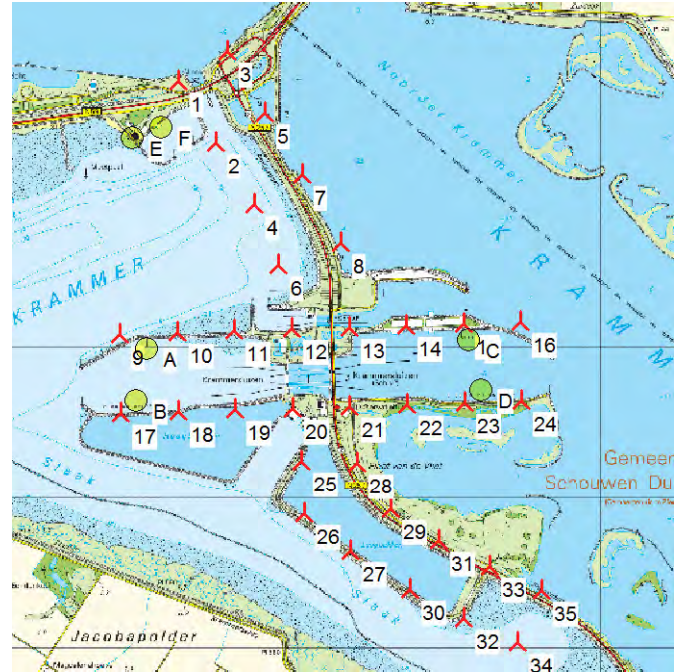
Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:
Obstacles used in calculation

Eye height: 1,5 m
Grid resolution: 10 m

Scale 1:50.000
New WTG
Shadow receptor



Scale 1:50.000
New WTG
Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	69.204	410.744	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	69.454	410.334	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	69.530	410.943	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	69.704	409.924	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.778	410.532	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.865	409.526	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	70.028	410.122	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	70.278	409.674	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	68.816	409.067	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.196	409.079	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.575	409.090	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.955	409.102	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.335	409.113	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.715	409.125	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	71.095	409.137	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	71.475	409.148	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	68.821	408.544	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	69.201	408.555	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	69.581	408.567	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	69.960	408.578	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.340	408.590	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.720	408.602	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	71.100	408.613	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	71.480	408.625	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.017	408.225	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	70.038	407.871	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	70.342	407.624	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	70.389	408.213	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	70.609	407.904	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	70.738	407.369	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

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Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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SHADOW - Main Result

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RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	70.929	407.698	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.099	407.181	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
33	71.266	407.523	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
34	71.454	407.019	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
35	71.612	407.365	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	Shadow hours per year	Shadow days per year	Max shadow hours per day	Shadow hours per year	
	[h/year]	[days/year]	[h/day]	[h/year]	
A	251:57	262	2:29	46:50	
B	503:48	224	4:18	113:04	
C	315:19	297	1:50	60:28	
D	501:32	246	4:36	109:48	
E	39:01	134	0:41	7:57	
F	89:29	205	0:59	15:41	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (43)	0:00	0:00
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (44)	81:24	15:12
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (45)	0:00	0:00
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (46)	17:31	2:21
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (47)	16:51	4:04
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (48)	8:04	1:04
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (49)	5:09	0:51
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (50)	0:00	0:00
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (51)	55:21	13:04
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (52)	52:55	12:31
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (53)	26:04	6:30
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (54)	9:03	2:15
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (55)	16:29	3:41
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (56)	67:33	16:09
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (57)	0:00	0:00
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (58)	104:31	25:43
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (59)	425:38	91:05
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (60)	157:13	28:52
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (61)	29:33	5:24
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (62)	6:47	1:16
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (63)	11:36	2:16
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (64)	73:48	11:32

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Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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SHADOW - Main Result

...continued from previous page

No.	Name	Worst case	Expected
		[h/year]	[h/year]
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (65)	378:43	79:57
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (66)	161:22	30:04
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (67)	2:45	0:29
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (68)	0:22	0:03
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (69)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (70)	12:19	1:42
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (71)	2:28	0:16
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (72)	0:00	0:00
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (73)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (74)	0:00	0:00
33	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (75)	0:00	0:00
34	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (76)	0:00	0:00
35	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (77)	0:00	0:00

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

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

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

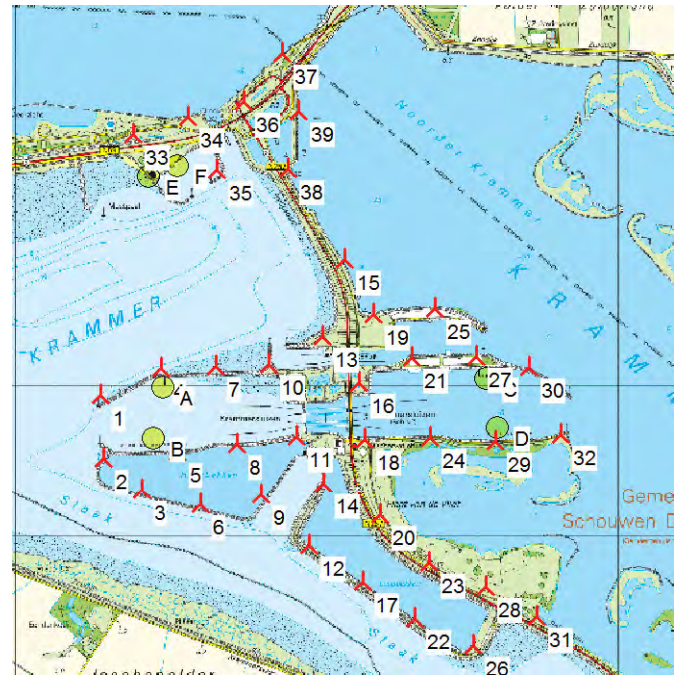
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:50.000

New WTG

Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.691	409.119	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	70.192	409.818	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.636	409.164	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

To be continued on next page...

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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SHADOW - Main Result

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RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
33	68.790	410.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
34	69.150	410.760	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
35	69.345	410.409	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
36	69.520	410.863	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
37	69.775	411.177	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
38	69.818	410.414	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
39	69.883	410.799	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	Shadow hours per year	Shadow days per year	Max shadow hours per day	Shadow hours per year	
	[h/year]	[days/year]	[h/day]	[h/year]	
A	269:54	351	1:31	51:27	
B	469:47	293	3:01	81:08	
C	331:22	300	1:58	67:35	
D	715:36	278	4:59	160:18	
E	52:18	110	0:51	12:46	
F	172:18	202	1:34	38:47	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (4)	47:10	9:53
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (5)	112:00	17:29
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (6)	79:34	9:11
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (7)	0:00	0:00
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (8)	256:48	47:32
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (9)	56:40	6:35
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (10)	91:03	23:26
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (11)	48:02	8:14
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (12)	20:16	2:49
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (13)	18:14	4:34
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (14)	9:28	1:44
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (15)	0:50	0:06
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (16)	6:52	1:42
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (17)	3:40	0:38
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (18)	0:48	0:07
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (19)	12:12	2:52
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (20)	0:45	0:05
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (21)	11:13	2:10
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (22)	19:37	4:36

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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Witteveen+Bos**SHADOW - Main Result**

...continued from previous page

No.	Name	Worst case [h/year]	Expected [h/year]
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (23)	5:25	0:49
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (24)	43:12	10:26
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (25)	0:00	0:00
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (26)	0:00	0:00
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (27)	90:35	15:26
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (28)	0:00	0:00
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (29)	0:00	0:00
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (30)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (31)	0:00	0:00
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (32)	649:17	140:57
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (33)	146:03	34:59
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (34)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (35)	71:15	15:02
33	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (36)	13:41	2:55
34	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (37)	0:00	0:00
35	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (38)	174:53	39:59
36	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (39)	0:00	0:00
37	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (40)	0:00	0:00
38	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (41)	14:59	3:10
39	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (42)	14:29	3:46

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Witteveen+Bos**SHADOW - Main Result****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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational hours are calculated from WTGs in calculation and wind

distribution:

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

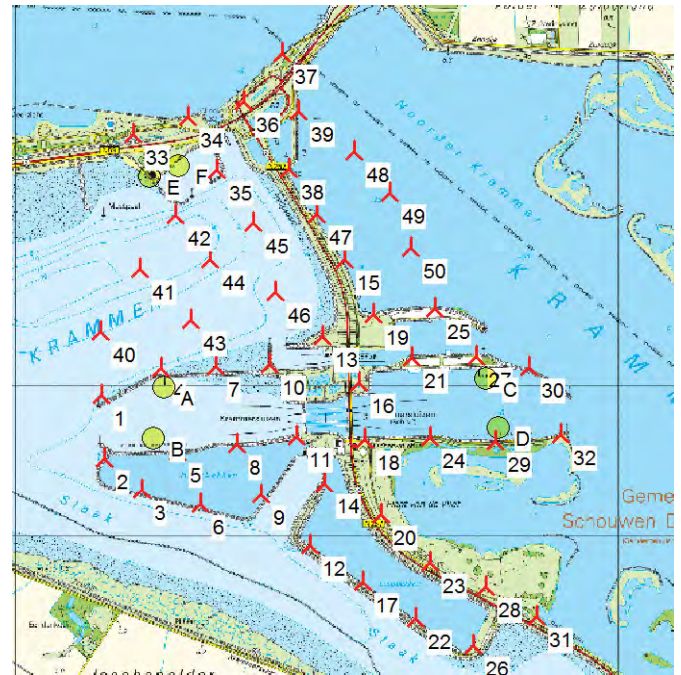
A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:

Obstacles used in calculation

Eye height: 1,5 m

Grid resolution: 10 m



Scale 1:50.000

New WTG

Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
10	69.691	409.119	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
15	70.192	409.818	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
21	70.637	409.164	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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SHADOW - Main Result

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RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
33	68.790	410.642	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
34	69.150	410.760	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
35	69.345	410.409	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
36	69.520	410.863	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
37	69.775	411.177	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
38	69.818	410.414	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
39	69.883	410.799	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
40	68.572	409.334	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
41	68.833	409.749	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
42	69.070	410.110	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
43	69.169	409.414	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
44	69.296	409.812	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
45	69.587	410.056	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
46	69.731	409.599	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
47	70.004	410.118	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
48	70.256	410.527	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
49	70.491	410.257	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
50	70.630	409.895	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	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	377:42	352	2:11	67:42	
B	635:22	365	3:46	122:07	
C	444:22	327	2:35	85:40	
D	661:58	267	4:16	170:38	
E	308:48	324	1:47	55:07	
F	513:41	342	2:33	98:06	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (98)	61:56	14:11
2	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (99)	136:22	23:15
3	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (100)	132:56	17:53
4	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (101)	0:00	0:00
5	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (102)	360:57	71:19
6	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (103)	70:51	9:24
7	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (104)	52:38	13:29
8	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (105)	69:53	13:20

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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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SHADOW - Main Result

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No.	Name	Worst case [h/year]	Expected [h/year]
9	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (106)	41:03	5:52
10	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (107)	33:17	8:25
11	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (108)	29:40	5:47
12	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (109)	5:30	0:54
13	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (110)	33:10	8:15
14	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (111)	21:02	3:44
15	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (112)	4:51	0:51
16	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (113)	33:47	8:14
17	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (114)	0:00	0:00
18	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (115)	26:31	5:16
19	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (116)	26:40	6:07
20	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (117)	27:32	3:46
21	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (118)	82:42	19:20
22	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (119)	0:00	0:00
23	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (120)	0:00	0:00
24	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (121)	103:33	20:23
25	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (122)	0:00	0:00
26	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (123)	0:00	0:00
27	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (124)	0:00	0:00
28	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (125)	0:00	0:00
29	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (126)	585:52	141:25
30	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (127)	101:39	23:43
31	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (128)	0:00	0:00
32	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (129)	97:16	22:08
33	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (130)	0:00	0:00
34	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (131)	0:00	0:00
35	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (132)	263:35	64:02
36	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (133)	0:00	0:00
37	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (134)	0:00	0:00
38	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (135)	30:00	6:47
39	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (136)	36:34	8:55
40	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (137)	0:00	0:00
41	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (138)	25:20	2:40
42	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (139)	256:15	37:26
43	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (140)	0:00	0:00
44	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (141)	77:54	8:40
45	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (142)	51:01	8:39
46	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (143)	33:39	3:54
47	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (144)	16:42	2:52
48	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (145)	6:09	1:24
49	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (146)	0:00	0:00
50	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (147)	0:00	0:00

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational hours are calculated from WTGs in calculation and wind

distribution:

Default Meteo data description

Operational time

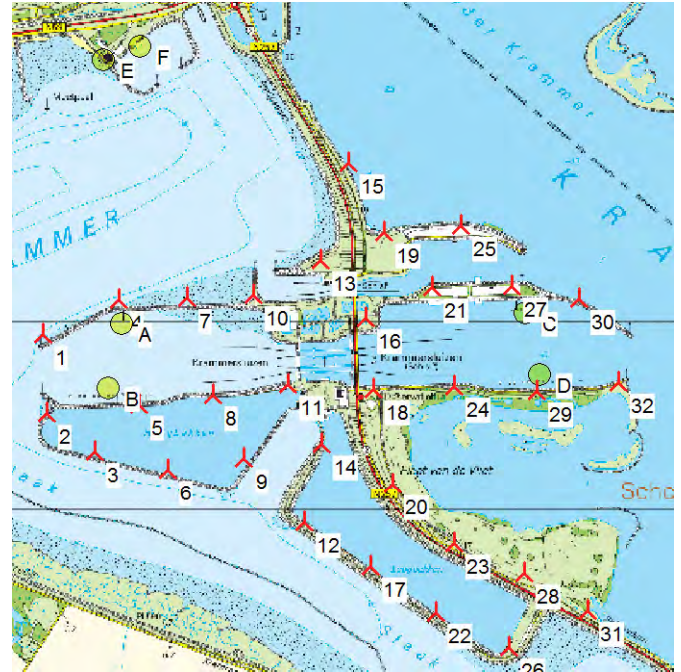
N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:
Obstacles used in calculation

Eye height: 1,5 m
Grid resolution: 10 m



New WTG

Shadow receptor

WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									[RPM]
1	68.575	408.913	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
2	68.595	408.494	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
3	68.847	408.287	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
4	68.976	409.097	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
5	69.081	408.540	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
6	69.234	408.191	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
7	69.336	409.107	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
8	69.477	408.591	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
9	69.637	408.255	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
10	69.691	409.119	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
11	69.872	408.645	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
12	69.959	407.914	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
13	70.046	409.306	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
14	70.054	408.332	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
15	70.192	409.818	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
16	70.286	409.001	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
17	70.313	407.676	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
18	70.325	408.623	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
19	70.382	409.453	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
20	70.431	408.118	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
21	70.637	409.164	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
22	70.660	407.432	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
23	70.756	407.802	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
24	70.757	408.637	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
25	70.789	409.490	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
26	71.046	407.251	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
27	71.063	409.170	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
28	71.129	407.642	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
29	71.193	408.611	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
30	71.416	409.103	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

To be continued on next page...

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	71.466	407.444	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0
32	71.626	408.658	0,0 Siemens SWT-3.0-101 3000 101.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	101,0	79,5	1.371	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	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	269:54	351	1:31	51:27	
B	469:47	293	3:01	81:08	
C	331:33	300	1:58	67:37	
D	715:36	278	4:59	160:18	
E	0:00	0	0:00	0:00	
F	0:50	12	0:06	0:07	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (98)	47:10	9:53
2	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (99)	112:00	17:29
3	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (100)	79:34	9:11
4	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (101)	0:00	0:00
5	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (102)	256:48	47:32
6	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (103)	56:40	6:35
7	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (104)	91:03	23:26
8	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (105)	48:02	8:14
9	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (106)	20:16	2:49
10	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (107)	18:14	4:34
11	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (108)	9:28	1:44
12	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (109)	0:50	0:06
13	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (110)	6:52	1:42
14	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (111)	3:40	0:38
15	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (112)	0:48	0:07
16	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (113)	12:12	2:52
17	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (114)	0:45	0:05
18	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (115)	11:13	2:10
19	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (116)	19:37	4:36
20	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (117)	5:25	0:49
21	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (118)	43:23	10:28
22	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (119)	0:00	0:00
23	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (120)	0:00	0:00
24	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (121)	90:35	15:26
25	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (122)	0:00	0:00

To be continued on next page...

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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SHADOW - Main Result

...continued from previous page

No.	Name	Worst case	Expected
		[h/year]	[h/year]
26	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (123)	0:00	0:00
27	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (124)	0:00	0:00
28	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (125)	0:00	0:00
29	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (126)	649:17	140:57
30	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (127)	146:03	34:59
31	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (128)	0:00	0:00
32	Siemens SWT-3.0-101 3000 101.0 !O! hub: 79,5 m (129)	71:15	15:02

Project:

Alternatief: VKA overnachtingsplaatsen

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SHADOW - Main Result

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

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational hours are calculated from WTGs in calculation and wind

distribution:

Default Meteo data description

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

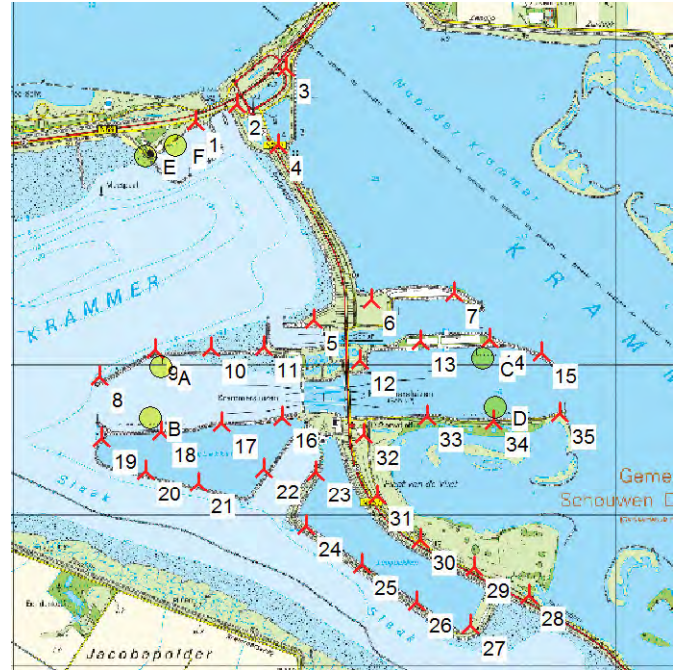
Idle start wind speed: Cut in wind speed from power curve

A ZVI (Zones of Visual Influence) calculation is performed before flicker calculation so non visible WTG do not contribute to calculated flicker values. A WTG will be visible if it is visible from any part of the receiver window. The ZVI calculation is based on the following assumptions:

Height contours used:
Obstacles used in calculation

Eye height: 1,5 m
Grid resolution: 10 m

Scale 1:50.000
New WTG
Shadow receptor



WTGs

RD1				WTG type				Shadow data			
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1		[m]									
1	69.225	410.594	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
2	69.496	410.706	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
3	69.821	410.949	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
4	69.769	410.442	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
5	70.006	409.278	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
6	70.389	409.415	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
7	70.940	409.460	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
8	68.586	408.901	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
9	68.956	409.080	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
10	69.324	409.092	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
11	69.673	409.103	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
12	70.312	409.014	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
13	70.715	409.138	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
14	71.172	409.153	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
15	71.520	409.063	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
16	69.794	408.636	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
17	69.394	408.595	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
18	68.995	408.541	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
19	68.596	408.493	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
20	68.889	408.277	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
21	69.239	408.193	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
22	69.677	408.291	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
23	70.019	408.274	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
24	69.957	407.909	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
25	70.324	407.656	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
26	70.688	407.406	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
27	71.047	407.250	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
28	71.432	407.452	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
29	71.071	407.638	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
30	70.717	407.822	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

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Project:

Alternatief: VKA overnachtingsplaatsen

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SHADOW - Main Result

...continued from previous page

RD1				WTG type			Shadow data				
East	North	Z	Row data/Description	Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
RD1 [m]											
31	70.425	408.113	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
32	70.337	408.523	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
33	70.761	408.640	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
34	71.201	408.614	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0
35	71.639	408.660	0,0 Siemens SWT-3.0-101 3000 113.0 !...	Yes	Siemens	SWT-3.0-101-3.000	3.000	113,0	122,5	1.357	16,0

Shadow receptor-Input

RD1									
No.	East	North	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
A	68.990	408.967	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
B	68.921	408.627	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
C	71.131	409.027	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
D	71.209	408.699	0,0	0,1	0,1	2,0	0,0	90,0	"Green house mode"
E	68.894	410.366	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"
F	69.085	410.437	0,0	0,1	0,1	1,0	0,0	0,0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case				Shadow, expected values	
No.	Shadow hours per year	Shadow days per year	Max shadow hours per day	Shadow hours per year	
	[h/year]	[days/year]	[h/day]	[h/year]	
A	388:31	354	2:09	71:52	
B	786:14	363	4:15	156:12	
C	482:01	323	2:25	94:47	
D	648:34	279	4:13	166:39	
E	35:00	85	0:35	8:49	
F	25:23	52	0:38	5:54	

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (81)	0:00	0:00
2	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (82)	18:04	4:42
3	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (83)	4:17	1:06
4	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (84)	34:46	8:11
5	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (85)	31:53	7:58
6	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (86)	34:35	7:45
7	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (87)	0:00	0:00
8	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (88)	63:19	14:19
9	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (89)	0:00	0:00
10	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (90)	63:23	16:09
11	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (91)	35:40	8:56
12	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (92)	36:40	8:59
13	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (93)	101:01	23:21
14	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (94)	0:00	0:00
15	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (95)	117:53	27:42
16	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (96)	28:28	5:28
17	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (97)	94:53	18:04
18	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (98)	499:00	102:49
19	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (99)	136:55	23:26
20	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (100)	129:02	16:58
21	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (101)	69:43	9:15
22	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (102)	33:56	5:10

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Project:

Alternatief: VKA overnachtingsplaatsen

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Witteveen+Bos**SHADOW - Main Result**

...continued from previous page

No.	Name	Worst case	Expected
		[h/year]	[h/year]
23	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (103)	20:17	3:28
24	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (104)	5:32	0:53
25	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (105)	0:00	0:00
26	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (106)	0:00	0:00
27	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (107)	0:00	0:00
28	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (108)	0:00	0:00
29	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (109)	0:00	0:00
30	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (110)	0:00	0:00
31	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (111)	27:02	3:41
32	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (112)	26:13	4:59
33	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (113)	105:26	20:50
34	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (114)	577:21	138:41
35	Siemens SWT-3.0-101 3000 113.0 !O! hub: 122,5 m (115)	92:35	20:53

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (9)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:51		10:16 (10)	08:24	09:06 (11)	07:31		08:08 (12)	07:21		06:17		06:59 (3)	05:32		06:19 (21)		
	16:44	100	14:41 (9)	17:31	6	09:12 (11)	18:23	13	08:21 (12)	20:16		21:06	38	07:37 (3)	21:52	113	20:43 (1)	
2	08:51		10:17 (10)	08:23		09:04 (11)	07:29		08:06 (12)	07:19		06:15		06:59 (3)	05:32		06:19 (21)	
	16:45	100	14:42 (9)	17:33	9	09:13 (11)	18:24	14	08:20 (12)	20:18		21:08	37	07:36 (3)	21:53	116	20:44 (1)	
3	08:50		10:18 (10)	08:21		09:02 (11)	07:27		08:08 (12)	07:17		06:13		06:59 (3)	05:31		06:21 (21)	
	16:46	99	14:42 (9)	17:35	11	09:13 (11)	18:26	9	08:17 (12)	20:19		21:10	36	07:35 (3)	21:54	119	20:46 (1)	
4	08:50		10:18 (10)	08:19		09:00 (11)	07:25			07:14		06:11		07:00 (3)	05:30		06:22 (21)	
	16:47	98	14:42 (9)	17:37	14	09:14 (11)	18:28			20:21		21:11	35	07:35 (3)	21:55	120	20:47 (1)	
5	08:50		10:19 (10)	08:18		08:59 (11)	07:23			07:12		06:10		07:00 (3)	05:29		06:25 (2)	
	16:49	97	14:42 (9)	17:39	16	09:15 (11)	18:30			20:23		21:13	34	07:34 (3)	21:56	119	20:47 (1)	
6	08:50		10:19 (10)	08:16		08:57 (11)	07:20			07:10		06:08		07:01 (3)	05:29		06:25 (2)	
	16:50	97	14:42 (9)	17:41	19	09:16 (11)	18:31			20:24		21:15	32	07:33 (3)	21:57	122	20:49 (1)	
7	08:49		10:20 (10)	08:14		08:55 (11)	07:18			07:08		06:06		07:02 (3)	05:28		06:25 (2)	
	16:51	95	14:42 (9)	17:42	21	09:16 (11)	18:33			20:26		21:16	30	07:32 (3)	21:58	126	20:50 (1)	
8	08:49		10:21 (10)	08:13		08:53 (11)	07:16			07:05		06:04		07:03 (3)	05:28		06:24 (2)	
	16:52	93	14:42 (9)	17:44	23	09:16 (11)	18:35			20:28		21:18	28	07:31 (3)	21:58	129	20:51 (1)	
9	08:48		10:21 (10)	08:11		08:51 (11)	07:14			07:03		06:03		07:04 (3)	05:27		06:23 (2)	
	16:54	93	14:42 (9)	17:46	25	09:16 (11)	18:37			20:29		21:19	26	07:30 (3)	21:59	132	20:52 (1)	
10	08:48		10:22 (10)	08:09		08:49 (11)	07:12			07:01		06:01		07:05 (3)	05:27		06:22 (2)	
	16:55	89	14:41 (9)	17:48	27	09:16 (11)	18:38			20:31	2	07:39 (4)	23	07:28 (3)	22:00	134	20:52 (1)	
11	08:47		10:22 (10)	08:07		08:47 (11)	07:09			06:59		07:35 (4)	05:59	07:07 (3)	05:26		06:23 (2)	
	16:56	88	14:41 (9)	17:50	29	09:16 (11)	18:40			20:33	5	07:40 (4)	21:23	20 07:27 (3)	22:01	135	20:53 (1)	
12	08:47		10:24 (10)	08:06		08:45 (11)	07:07			06:57		07:32 (4)	05:58	07:09 (3)	05:26		06:23 (2)	
	16:58	85	14:41 (9)	17:52	31	09:16 (11)	18:42			20:34	7	07:39 (4)	21:24	15 07:24 (3)	22:02	137	20:54 (1)	
13	08:46		10:24 (10)	08:04		08:43 (22)	07:05			06:54		07:30 (4)	05:56	07:12 (3)	05:26		06:23 (2)	
	16:59	84	14:41 (9)	17:54	32	09:15 (11)	18:44			20:36	9	07:39 (4)	21:26	9 07:21 (3)	22:02	137	20:54 (1)	
14	08:45		10:25 (10)	08:02		08:41 (22)	07:02			06:52		07:28 (3)	05:54		05:26		06:23 (2)	
	17:01	80	14:40 (9)	17:55	34	09:15 (11)	18:45			20:38	10	07:38 (4)	21:27		22:03	139	20:55 (1)	
15	08:44		10:26 (10)	08:00		08:39 (22)	07:00			06:50		07:26 (3)	05:53		05:25		06:23 (2)	
	17:02	78	14:40 (9)	17:57	35	09:14 (11)	18:47			20:40	12	07:38 (4)	21:29		22:03	141	20:56 (1)	
16	08:44		10:26 (10)	07:58		08:46 (11)	06:58			06:48		07:24 (3)	05:51	06:32 (21)	05:25		06:23 (2)	
	17:04	74	14:38 (9)	17:59	27	09:13 (11)	18:49			20:41	13	07:37 (4)	21:30	2 06:34 (21)	22:04	141	20:56 (1)	
17	08:43		10:27 (10)	07:56		08:47 (11)	06:56			06:46		07:22 (3)	05:50	06:31 (21)	05:25		06:23 (2)	
	17:06	70	14:37 (9)	18:01	25	09:12 (11)	18:51			20:43	15	07:37 (4)	21:32	3 06:34 (21)	22:04	142	20:57 (1)	
18	08:42		10:28 (10)	07:54		08:48 (11)	06:53			06:44		07:20 (3)	05:48	06:29 (21)	05:25		06:23 (2)	
	17:07	65	14:36 (9)	18:03	22	09:10 (11)	18:52			20:45	16	07:36 (3)	21:33	5 06:34 (21)	22:05	143	20:57 (1)	
19	08:41		10:30 (10)	07:52		08:50 (11)	06:51			06:41		07:18 (3)	05:47	06:28 (21)	05:25		06:23 (2)	
	17:09	58	14:34 (9)	18:05	18	09:08 (11)	18:54			20:46	19	07:37 (3)	21:35	6 06:34 (21)	22:05	143	20:57 (1)	
20	08:40		10:30 (10)	07:50		08:53 (11)	06:49			06:39		07:16 (3)	05:46	06:27 (21)	05:25		06:23 (2)	
	17:10	47	14:29 (9)	18:06	13	09:06 (11)	18:56			20:48	22	07:38 (3)	21:36	8 06:35 (21)	22:05	143	20:57 (1)	
21	08:39		10:32 (10)	07:48			06:47			06:37		07:14 (3)	05:44	06:26 (21)	05:25		06:23 (2)	
	17:12	37	11:09 (10)	18:08			18:57			20:50	24	07:38 (3)	21:38	9 06:35 (21)	22:06	143	20:57 (1)	
22	08:38		10:33 (10)	07:46			06:44			06:35		07:12 (3)	05:43	06:25 (21)	05:26		06:23 (2)	
	17:14	35	11:08 (10)	18:10			18:59			20:51	26	07:38 (3)	21:39	10 06:35 (21)	22:06	143	20:57 (1)	
23	08:36		10:34 (10)	07:44		08:22 (12)	06:42			06:33		07:10 (3)	05:42	06:24 (21)	05:26		06:24 (2)	
	17:16	33	11:07 (10)	18:12	3	08:25 (12)	19:01			20:53	29	07:39 (3)	21:40	11 06:35 (21)	22:06	143	20:58 (1)	
24	08:35		10:37 (10)	07:42		08:19 (12)	06:40			06:31		07:08 (3)	05:41	06:23 (21)	05:26		06:24 (2)	
	17:17	29	11:06 (10)	18:14	5	08:24 (12)	19:02			20:55	31	07:39 (3)	21:42	26 07:00 (2)	22:06	143	20:58 (1)	
25	08:34		10:38 (10)	07:40		08:17 (12)	06:37			06:29		07:06 (3)	05:39	06:22 (21)	05:26		06:24 (2)	
	17:19	26	11:04 (10)	18:15	7	08:24 (12)	19:04			20:56	32	07:38 (3)	21:43	56 20:26 (1)	22:06	143	20:58 (1)	
26	08:33		10:41 (10)	07:38		08:15 (12)	06:35			06:27		07:04 (3)	05:38	06:21 (21)	05:27		06:25 (2)	
	17:21	21	11:02 (10)	18:17	9	08:24 (12)	19:06			20:58	34	07:38 (3)	21:44	71 20:30 (1)	22:06	141	20:58 (1)	
27	08:31		10:44 (10)	07:36		08:13 (12)	06:33			06:25		07:02 (3)	05:37	06:20 (21)	05:27		06:25 (2)	
	17:22	15	10:59 (10)	18:19	11	08:24 (12)	19:08			21:00	36	07:38 (3)	21:46	82 20:33 (1)	22:06	141	20:58 (1)	
28	08:30			07:33		08:10 (12)	06:30			06:23		07:00 (3)	05:36	06:19 (21)	05:28		06:26 (2)	
	17:24			18:21	12	08:22 (12)	19:09			21:01	38	07:38 (3)	21:47	92 20:36 (1)	22:06	139	20:58 (1)	
29	08:29						07:28			06:21		06:59 (3)	05:35	06:18 (21)	05:28		06:26 (2)	
	17:26						20:11			21:03	39	07:38 (3)	21:48	99 20:38 (1)	22:06	139	20:58 (1)	
30	08:27						07:26			06:19		06:59 (3)	05:34	06:17 (21)	05:29		06:27 (2)	
	17:28						20:13			21:05	38	07:37 (3)	21:49	105 20:39 (1)	22:06	137	20:58 (1)	
31	08:26		09:08 (11)				07:24						05:33		06:17 (21)			
	17:30	3	09:11 (11)				20:14						21:50	110 20:41 (21)				
Potential sun hours	260			278			367			416		457		484		497		
Total, worst case		1889		484			36					457		1058		4043		
Sun reduction		0,18		0,27			0,30					0,38		0,43		0,38		
Oper. time red.		0,97		0,97			0,97					0,97		0,97		0,97		
Wind dir. red.		0,65		0,57			0,55					0,62		0,63		0,62		
Total reduction		0,12		0,15			0,16					0,23		0,26		0,23		
Total, real		222		72			6					107		280		940		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (9)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October			November			December		
1	05:29		06:27 (2)	06:06	07:18 (3)	06:55		07:34 (4)	07:43		07:36		08:19 (11)	08:27	10:04 (10)			
	22:05	135	20:57 (1)	21:34	17	07:35 (3)	20:33	4	07:38 (4)	19:24		17:18	27	08:46 (11)	16:38	88	14:23 (9)	
2	05:30		06:27 (2)	06:07	07:17 (3)	06:56		07:35 (4)	07:45		07:38		08:21 (11)	08:28	10:05 (10)			
	22:05	134	20:57 (1)	21:32	21	07:38 (3)	20:30	2	07:37 (4)	19:21		17:16	25	08:46 (11)	16:38	90	14:24 (9)	
3	05:31		06:28 (2)	06:09	07:15 (3)	06:58			07:46		07:40		08:23 (11)	08:30	10:05 (10)			
	22:05	132	20:57 (1)	21:31	24	07:39 (3)	20:28		19:19		17:14	23	08:46 (11)	16:37	93	14:26 (9)		
4	05:32		06:29 (2)	06:10	07:13 (3)	07:00			07:48		07:42		08:25 (11)	08:31	10:05 (10)			
	22:04	129	20:56 (1)	21:29	27	07:40 (3)	20:26		19:17		17:13	21	08:46 (11)	16:36	93	14:26 (9)		
5	05:32		06:30 (2)	06:12	07:13 (3)	07:01			07:50		07:43		08:27 (11)	08:32	10:06 (10)			
	22:04	127	20:56 (1)	21:27	28	07:41 (3)	20:24		19:15		17:11	18	08:45 (11)	16:36	95	14:28 (9)		
6	05:33		06:31 (2)	06:13	07:11 (3)	07:03			07:51		07:45		08:29 (11)	08:34	10:05 (10)			
	22:03	125	20:56 (1)	21:26	31	07:42 (3)	20:21		19:12		17:09	16	08:45 (11)	16:36	96	14:28 (9)		
7	05:34		06:32 (2)	06:15	07:11 (3)	07:04			07:53		07:47		08:31 (11)	08:35	10:05 (10)			
	22:03	121	20:55 (1)	21:24	32	07:43 (3)	20:19		19:10		17:08	14	08:45 (11)	16:35	97	14:28 (9)		
8	05:35		06:30 (21)	06:16	07:10 (3)	07:06			07:55		07:49		08:33 (11)	08:36	10:06 (10)			
	22:02	120	20:54 (1)	21:22	34	07:44 (3)	20:17		19:08		17:06	11	08:44 (11)	16:35	98	14:30 (9)		
9	05:36		06:28 (21)	06:18	07:09 (3)	07:08			07:56		07:51		08:35 (11)	08:37	10:06 (10)			
	22:02	120	20:53 (1)	21:20	36	07:45 (3)	20:14		19:06		17:04	8	08:43 (11)	16:35	99	14:30 (9)		
10	05:37		06:27 (21)	06:19	07:08 (3)	07:09			07:58		08:45 (12)	07:52	08:37 (11)	08:38	10:06 (10)			
	22:01	117	20:52 (1)	21:18	37	07:45 (3)	20:12		19:03	3	08:48 (12)	17:03	6	08:43 (11)	16:34	100	14:31 (9)	
11	05:38		06:26 (21)	06:21	07:07 (3)	07:11			08:00		08:41 (12)	07:54		08:39 (11)	08:39	10:07 (10)		
	22:00	115	20:51 (1)	21:16	38	07:45 (3)	20:10		19:01	11	08:52 (12)	17:01	3	08:42 (11)	16:34	99	14:31 (9)	
12	05:39		06:26 (21)	06:23	07:07 (3)	07:12			08:01		08:40 (12)	07:56		08:40	10:08 (10)			
	21:59	111	20:50 (1)	21:14	38	07:45 (3)	20:08		18:59	13	08:53 (12)	17:00		16:34	101	14:33 (9)		
13	05:40		06:25 (21)	06:24	07:06 (3)	07:14			08:03		08:42 (12)	07:58		08:41	10:08 (10)			
	21:58	108	20:48 (1)	21:13	39	07:45 (3)	20:05		18:57	13	08:55 (12)	16:58		16:34	101	14:33 (9)		
14	05:41		06:26 (21)	06:26	07:07 (3)	07:16			08:05		08:44 (12)	07:59		08:42	10:09 (10)			
	21:57	102	20:47 (1)	21:11	39	07:46 (3)	20:03		18:55	12	08:56 (12)	16:57		16:34	102	14:34 (9)		
15	05:42		06:27 (21)	06:27	07:08 (3)	07:17			08:07		08:46 (12)	08:01	10:17 (10)	08:43	10:09 (10)			
	21:56	96	20:45 (1)	21:09	37	07:45 (3)	20:01		18:52	10	08:56 (12)	16:55	15	10:32 (10)	16:34	102	14:35 (9)	
16	05:44		06:28 (21)	06:29	07:10 (3)	07:19			08:08		08:48 (12)	08:03		10:14 (10)	08:44	10:09 (10)		
	21:55	88	20:43 (1)	21:07	36	07:46 (3)	19:58		18:50	8	08:56 (12)	16:54	21	10:35 (10)	16:34	102	14:34 (9)	
17	05:45		06:29 (21)	06:31	07:11 (3)	07:20			08:10		08:50 (12)	08:04		10:12 (10)	08:45	10:09 (10)		
	21:54	78	20:40 (1)	21:05	34	07:45 (3)	19:56		18:48	7	08:57 (12)	16:53	26	10:38 (10)	16:34	103	14:35 (9)	
18	05:46		06:31 (21)	06:32	07:13 (3)	07:22			08:12		08:51 (12)	08:06		10:11 (10)	08:46	10:10 (10)		
	21:53	64	20:38 (1)	21:03	32	07:45 (3)	19:54		18:46	4	08:55 (12)	16:51	29	10:40 (10)	16:35	103	14:36 (9)	
19	05:47		06:32 (21)	06:34	07:14 (3)	07:24			08:13		08:53 (12)	08:08		10:09 (10)	08:46	10:11 (10)		
	21:52	44	20:32 (1)	21:01	30	07:44 (3)	19:51		18:44	2	08:55 (12)	16:50	33	10:42 (10)	16:35	103	14:37 (9)	
20	05:49		06:33 (21)	06:35	07:16 (3)	07:25			08:15		08:10		10:08 (10)	08:47	10:10 (10)			
	21:51	18	07:06 (2)	20:58	28	07:44 (3)	19:49		18:42		16:49		35	10:43 (10)	16:35	103	14:36 (9)	
21	05:50		06:34 (21)	06:37	07:17 (3)	07:27			08:17		09:26 (11)	08:11		10:08 (10)	08:48	10:11 (10)		
	21:50	10	06:44 (21)	20:56	26	07:43 (3)	19:47		18:40	7	09:33 (11)	16:48	37	10:45 (10)	16:36	103	14:37 (9)	
22	05:51		06:35 (21)	06:39	07:19 (3)	07:28			08:19		09:22 (11)	08:13		10:07 (10)	08:48	10:11 (10)		
	21:49	9	06:44 (21)	20:54	24	07:43 (3)	19:44		18:38	15	09:37 (11)	16:46	47	14:06 (9)	16:36	103	14:37 (9)	
23	05:53		06:36 (21)	06:40	07:20 (3)	07:30			08:20		09:20 (11)	08:15		10:06 (10)	08:49	10:12 (10)		
	21:47	8	06:44 (21)	20:52	21	07:41 (3)	19:42		18:36	19	09:39 (11)	16:45	58	14:10 (9)	16:37	103	14:38 (9)	
24	05:54		06:38 (21)	06:42	07:22 (3)	07:32			08:22		09:18 (11)	08:16		10:05 (10)	08:49	10:13 (10)		
	21:46	7	06:45 (21)	20:50	19	07:41 (3)	19:40		18:34	23	09:41 (11)	16:44	65	14:13 (9)	16:37	103	14:39 (9)	
25	05:55		06:39 (21)	06:43	07:23 (3)	07:33			07:24		08:17 (11)	08:18		10:05 (10)	08:49	10:13 (10)		
	21:45	6	06:45 (21)	20:48	16	07:39 (3)	19:37		17:32	25	08:42 (11)	16:43	70	14:15 (9)	16:38	103	14:39 (9)	
26	05:57		06:40 (21)	06:45	07:25 (3)	07:35			07:26		08:10 (22)	08:19		10:05 (10)	08:50	10:14 (10)		
	21:43	4	06:44 (21)	20:46	15	07:40 (4)	19:35		17:30	32	08:43 (11)	16:42	74	14:17 (9)	16:39	103	14:40 (9)	
27	05:58		06:42 (21)	06:47	07:26 (3)	07:37			07:27		08:09 (22)	08:21		10:05 (10)	08:50	10:14 (10)		
	21:42	3	06:45 (21)	20:44	13	07:39 (4)	19:33		17:28	35	08:44 (11)	16:41	78	14:19 (9)	16:39	103	14:40 (9)	
28	06:00		06:43 (21)	06:48	07:28 (3)	07:38			07:29		08:11 (22)	08:22		10:04 (10)	08:50	10:15 (10)		
	21:40	2	06:44 (21)	20:41	12	07:40 (4)	19:31		17:26	34	08:45 (11)	16:41	80	14:19 (9)	16:40	102	14:40 (9)	
29	06:01			06:50	07:29 (3)	07:40			07:31		08:13 (11)	08:24		10:05 (10)	08:50	10:15 (10)		
	21:39			20:39	10	07:39 (4)	19:28		17:24	32	08:45 (11)	16:40	82	14:21 (9)	16:41	103	14:41 (9)	
30	06:03			06:51	07:31 (4)	07:41			07:33		08:15 (11)	08:25		10:05 (10)	08:51	10:16 (10)		
	21:37			20:37	9	07:40 (4)	19:26		17:22	31	08:46 (11)	16:39	86	14:23 (9)	16:42	101	14:41 (9)	
31	06:04		07:21 (3)	06:53	07:32 (4)				07:35		08:17 (11)			08:51	10:16 (10)			
	21:36	12	07:33 (3)	20:35	7	07:39 (4)			17:20	29	08:46 (11)			16:43	102	14:41 (9)		
Potential sun hours	501		453		381		332		267		245							
Total, worst case	2145		810		6		365		1008		3097							
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16							
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97							
Wind dir. red.	0,63		0,62		0,62		0,56		0,63		0,66							
Total reduction	0,24		0,26		0,22		0,17		0,14		0,11							
Total, real	523		208		1		62		136		326							

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (10)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	08:08 (22) 16:42 (9)	07:21 20:16	07:57 (12) 21:06
2	08:50 16:45	08:23 17:33	07:29 18:24	08:06 (22) 16:43 (9)	07:19 20:18	07:59 (12) 21:08
3	08:50 16:46	08:21 17:35	07:27 18:26	08:04 (22) 16:44 (9)	07:17 20:19	08:03 (11) 21:10
4	08:50 16:47	08:19 17:37	07:25 18:28	08:01 (22) 16:44 (9)	07:14 20:21	08:04 (11) 21:11
5	08:50 16:49	08:18 17:39	15:37 (9) 18:30	07:23 16:45 (9)	07:12 20:23	08:05 (11) 21:13
6	08:50 16:50	08:16 17:41	15:26 (9) 18:31	07:20 16:45 (9)	07:10 20:24	08:07 (11) 21:14
7	08:49 16:51	08:14 17:42	15:21 (9) 18:33	07:18 16:45 (9)	07:08 20:26	08:11 (11) 21:16
8	08:49 16:52	08:13 17:44	15:16 (9) 18:35	07:16 16:46 (9)	07:05 20:28	08:28 (10) 21:18
9	08:48 16:54	08:11 17:46	15:13 (9) 18:37	07:14 16:47 (9)	07:03 20:29	08:28 (10) 21:19
10	08:48 16:55	08:09 17:48	15:09 (9) 18:38	07:12 16:48 (9)	07:01 20:31	08:29 (10) 21:21
11	08:47 16:56	08:07 17:50	15:07 (9) 18:40	07:10 16:47 (9)	06:59 20:33	08:29 (10) 21:23
12	08:47 16:58	08:06 17:52	15:04 (9) 18:42	07:07 16:48 (9)	06:57 20:34	08:29 (10) 21:24
13	08:46 16:59	08:04 17:54	15:02 (9) 18:44	07:05 16:48 (9)	06:54 20:36	08:30 (10) 21:26
14	08:45 17:01	08:02 17:55	14:59 (9) 18:45	07:02 16:48 (9)	06:52 20:38	08:31 (10) 21:27
15	08:44 17:02	08:00 17:57	14:57 (9) 18:47	07:00 16:48 (9)	06:50 20:40	08:32 (10) 21:29
16	08:44 17:04	07:58 17:59	14:55 (9) 18:49	06:58 16:49 (9)	06:48 20:41	08:33 (10) 21:30
17	08:43 17:06	07:56 18:01	14:53 (9) 18:51	06:56 16:48 (9)	06:46 20:43	08:34 (10) 21:32
18	08:42 17:07	07:54 18:03	14:51 (9) 18:52	06:53 16:49 (9)	06:44 20:45	08:35 (10) 21:33
19	08:41 17:09	07:52 18:05	14:49 (9) 18:54	06:51 16:49 (9)	06:41 20:46	08:36 (10) 21:35
20	08:40 17:10	07:50 18:06	14:47 (9) 18:56	06:49 16:48 (9)	06:39 20:48	08:38 (10) 21:36
21	08:39 17:12	07:48 18:08	14:46 (9) 18:57	06:47 16:49 (9)	06:37 20:50	08:40 (10) 21:38
22	08:38 17:14	07:46 18:10	14:44 (9) 18:59	06:44 16:49 (9)	06:35 20:51	08:42 (10) 21:39
23	08:36 17:16	07:44 18:12	14:43 (9) 19:01	06:42 16:48 (9)	06:33 20:53	08:46 (10) 21:40
24	08:35 17:17	07:42 18:14	14:41 (9) 19:02	06:40 16:48 (9)	06:31 20:55	08:51 (10) 21:42
25	08:34 17:19	07:40 18:15	14:39 (9) 19:04	06:37 16:49 (9)	06:29 20:56	15:43 (9) 21:43
26	08:33 17:21	07:38 18:17	14:38 (9) 19:06	06:35 16:48 (9)	06:27 20:58	15:45 (9) 21:44
27	08:31 17:22	07:36 18:19	14:37 (9) 19:08	06:33 16:40 (9)	06:25 21:00	15:46 (9) 21:46
28	08:30 17:24	07:33 18:21	14:35 (9) 19:09	06:30 16:48 (9)	06:23 21:01	15:48 (9) 21:47
29	08:29 17:26		07:28 20:11	06:21 17:48 (9)	06:19 21:03	15:51 (9) 21:48
30	08:27 17:28		07:26 20:13	06:19 17:47 (9)	06:17 21:05	15:53 (9) 21:49
31	08:26 17:30		07:24 20:14	06:17 17:47 (9)		05:33 21:50
Potential sun hours	260	278	367	415	484	497
Total, worst case		2047	6429	5363	1157	
Sun reduction		0,27	0,30	0,38	0,43	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,69	0,65	0,66	0,69	
Total reduction		0,18	0,19	0,25	0,29	
Total, real		373	1234	1315	334	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (10)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December					
1	05:30		06:06	16:29 (9)	06:55	08:28 (10)	07:43	08:24 (10)	07:36	14:40 (9)	08:27					
	22:05		21:34	53	17:22 (9)	20:33	206	17:41 (9)	19:24	201	17:27 (9)	17:18	60	15:40 (9)	16:38	
2	05:30		06:07	16:27 (9)	06:56	08:27 (10)	07:45	08:25 (10)	07:38						14:43 (9)	08:28
	22:05		21:32	57	17:24 (9)	20:30	208	17:40 (9)	19:21	196	17:26 (9)	17:16	54	15:37 (9)	16:38	
3	05:31		06:09	16:24 (9)	06:58	08:26 (10)	07:46	08:27 (10)	07:40						14:47 (9)	08:30
	22:05		21:31	61	17:25 (9)	20:28	212	17:41 (9)	19:19	192	17:26 (9)	17:15	46	15:33 (9)	16:37	
4	05:32		06:10	16:21 (9)	07:00	08:25 (10)	07:48	08:28 (10)	07:42						14:51 (9)	08:31
	22:04		21:29	65	17:26 (9)	20:26	214	17:40 (9)	19:17	186	17:24 (9)	17:13	38	15:29 (9)	16:36	
5	05:32		06:12	16:19 (9)	07:01	08:08 (11)	07:50	08:31 (10)	07:43						14:57 (9)	08:32
	22:04		21:27	69	17:28 (9)	20:24	225	17:41 (9)	19:15	180	17:23 (9)	17:11	26	15:23 (9)	16:36	
6	05:33		06:13	16:17 (9)	07:03	08:03 (11)	07:51	08:33 (10)	07:45							08:34
	22:03		21:26	72	17:29 (9)	20:21	235	17:40 (9)	19:12	174	17:23 (9)	17:09				16:36
7	05:34		06:15	16:15 (9)	07:04	08:01 (11)	07:53	08:33 (22)	07:47							08:35
	22:03		21:24	75	17:30 (9)	20:19	241	17:40 (9)	19:10	168	17:22 (9)	17:08				16:35
8	05:35		06:16	16:12 (9)	07:06	07:58 (11)	07:55	08:33 (22)	07:49							08:36
	22:02		21:22	79	17:31 (9)	20:17	246	17:39 (9)	19:08	159	17:20 (9)	17:06				16:35
9	05:36		06:18	16:10 (9)	07:08	07:57 (11)	07:56	08:35 (22)	07:51							08:37
	22:01		21:20	82	17:32 (9)	20:14	249	17:40 (9)	19:06	142	17:19 (9)	17:04				16:35
10	05:37		06:19	16:07 (9)	07:09	07:53 (12)	07:58	08:37 (22)	07:52							08:38
	22:01		21:18	86	17:33 (9)	20:12	254	17:39 (9)	19:03	140	17:18 (9)	17:03				16:34
11	05:38		06:21	16:05 (9)	07:11	07:50 (12)	08:00	08:39 (22)	07:54							08:39
	22:00		21:16	88	17:33 (9)	20:10	257	17:39 (9)	19:01	137	17:17 (9)	17:01				16:34
12	05:39		06:23	16:03 (9)	07:12	07:51 (12)	08:01	08:40 (22)	07:56							08:40
	21:59		21:14	91	17:34 (9)	20:08	258	17:39 (9)	18:59	133	17:15 (9)	17:00				16:34
13	05:40		06:24	16:00 (9)	07:14	07:52 (11)	08:03	08:42 (22)	07:58							08:41
	21:58		21:13	94	17:34 (9)	20:05	256	17:38 (9)	18:57	129	17:14 (9)	16:58				16:34
14	05:41		06:26	15:58 (9)	07:16	07:54 (11)	08:05	15:08 (9)	07:59							08:42
	21:57		21:11	98	17:36 (9)	20:03	254	17:38 (9)	18:55	125	17:13 (9)	16:57				16:34
15	05:42		06:27	15:55 (9)	07:17	07:55 (11)	08:07	15:10 (9)	08:01							08:43
	21:56		21:09	101	17:36 (9)	20:01	253	17:37 (9)	18:52	122	17:12 (9)	16:55				16:34
16	05:44		06:29	15:54 (9)	07:19	07:57 (11)	08:08	15:11 (9)	08:03							08:44
	21:55		21:07	103	17:37 (9)	19:58	251	17:37 (9)	18:50	120	17:11 (9)	16:54				16:34
17	05:45		06:33 (4)	06:31	15:51 (9)	07:20	07:58 (11)	08:10	15:12 (9)	08:04						08:45
	21:54	5	06:38 (4)	21:05	106	17:37 (9)	19:56	249	17:36 (9)	18:48	118	17:10 (9)	16:53			16:34
18	05:46		06:32 (4)	06:32	15:49 (9)	07:22	08:00 (11)	08:12	15:12 (9)	08:06						08:46
	21:53	9	06:41 (4)	21:03	109	17:38 (9)	19:54	247	17:36 (9)	18:46	115	17:07 (9)	16:51			16:35
19	05:47		06:32 (4)	06:34	08:55 (10)	07:24	08:02 (11)	08:13	15:14 (9)	08:08						08:46
	21:52	10	06:42 (4)	21:01	126	17:38 (9)	19:51	245	17:36 (9)	18:44	112	17:06 (9)	16:50			16:35
20	05:49		06:33 (4)	06:35	08:51 (10)	07:25	08:03 (11)	08:15	15:15 (9)	08:10						08:47
	21:51	10	06:43 (4)	20:58	137	17:39 (9)	19:49	243	17:35 (9)	18:42	110	17:05 (9)	16:49			16:35
21	05:50		06:34 (4)	06:37	08:47 (10)	07:27	08:05 (11)	08:17	15:17 (9)	08:11						08:48
	21:50	10	06:44 (4)	20:56	147	17:39 (9)	19:47	240	17:35 (9)	18:40	106	17:03 (9)	16:48			16:36
22	05:51		06:35 (4)	06:39	08:44 (10)	07:28	08:06 (11)	08:19	15:18 (9)	08:13						08:48
	21:49	10	06:45 (4)	20:54	156	17:40 (9)	19:44	237	17:33 (9)	18:38	104	17:02 (9)	16:46			16:36
23	05:53		06:37 (4)	06:40	08:42 (10)	07:30	08:08 (11)	08:20	15:20 (9)	08:14						08:49
	21:47	9	06:46 (4)	20:52	161	17:39 (9)	19:42	234	17:33 (9)	18:36	100	17:00 (9)	16:45			16:37
24	05:54		06:38 (4)	06:42	08:40 (10)	07:32	08:10 (11)	08:22	15:21 (9)	08:16						08:49
	21:46	8	06:46 (4)	20:50	168	17:40 (9)	19:40	229	17:33 (9)	18:34	97	16:58 (9)	16:44			16:37
25	05:55		06:39 (4)	06:43	08:38 (10)	07:33	08:11 (11)	07:24	14:23 (9)	08:18						08:49
	21:45	13	17:02 (9)	20:48	175	17:40 (9)	19:37	224	17:32 (9)	17:32	93	15:56 (9)	16:43			16:38
26	05:57		06:40 (4)	06:45	08:36 (10)	07:35	08:20 (10)	07:26	14:25 (9)	08:19						08:50
	21:43	25	17:08 (9)	20:46	181	17:41 (9)	19:35	217	17:31 (9)	17:30	90	15:55 (9)	16:42			16:39
27	05:58		06:42 (4)	06:47	08:34 (10)	07:37	08:20 (10)	07:27	14:27 (9)	08:21						08:50
	21:42	33	17:13 (9)	20:44	185	17:40 (9)	19:33	215	17:30 (9)	17:28	86	15:53 (9)	16:41			16:39
28	06:00		06:43 (4)	06:48	08:33 (10)	07:38	08:21 (10)	07:29	14:29 (9)	08:22						08:50
	21:40	38	17:15 (9)	20:41	190	17:41 (9)	19:31	211	17:29 (9)	17:26	81	15:50 (9)	16:41			16:40
29	06:01		06:44 (4)	06:50	08:31 (10)	07:40	08:22 (10)	07:31	14:32 (9)	08:24						08:50
	21:39	42	17:17 (9)	20:39	194	17:40 (9)	19:28	209	17:29 (9)	17:24	76	15:48 (9)	16:40			16:41
30	06:03		06:46 (4)	06:52	08:31 (10)	07:41	08:22 (10)	07:33	14:34 (9)	08:25						08:51
	21:37	47	17:20 (9)	20:37	198	17:41 (9)	19:26	204	17:27 (9)	17:22	72	15:46 (9)	16:39			16:42
31	06:04		16:32 (9)	06:53	08:29 (10)			07:35	14:37 (9)							08:51
	21:36	49	17:21 (9)	20:35	201	17:40 (9)		17:20	15:43 (9)		66					16:43
Potential sun hours	501		453		381		332		267		245					
Total, worst case	318		3708		7023		3930		224							
Sun reduction	0,40		0,42		0,36		0,31		0,22							
Oper. time red.	0,97		0,97		0,97		0,97		0,97							
Wind dir. red.	0,69		0,67		0,65		0,68		0,69							
Total reduction	0,27		0,28		0,23		0,20		0,15							
Total, real	84		1025		1587		796		33							

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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17-03-2014 14:52 / 5

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (11)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:50		09:40 (16)	08:24	09:38 (16)	07:31	07:21		19:37 (4)	06:17	06:55 (8)	05:32
	16:44	104	15:51 (14)	17:31	16:17 (14)	18:22	20:16	2	19:38 (4)	21:06	81	20:21 (6)
2	08:50		09:40 (16)	08:23	09:39 (16)	07:29	07:19		19:36 (4)	06:15	06:53 (8)	05:31
	16:45	103	15:52 (14)	17:33	16:15 (14)	18:24	20:18	3	19:39 (4)	21:08	84	20:20 (6)
3	08:50		09:39 (16)	08:21	09:40 (16)	07:27	07:17		19:36 (4)	06:13	06:51 (8)	05:31
	16:46	105	15:53 (14)	17:35	16:14 (14)	18:26	20:19	5	19:41 (4)	21:09	88	20:20 (6)
4	08:50		09:39 (16)	08:19	09:41 (16)	07:25	07:14		19:37 (4)	06:11	06:50 (8)	05:30
	16:47	106	15:55 (14)	17:37	16:12 (14)	18:28	20:21	5	19:42 (4)	21:11	92	20:21 (6)
5	08:50		09:39 (16)	08:18	09:42 (16)	07:22	07:12		19:36 (5)	06:10	06:48 (8)	05:29
	16:48	104	15:56 (14)	17:39	16:10 (14)	18:30	20:23	8	19:44 (4)	21:13	94	20:20 (6)
6	08:49		09:38 (16)	08:16	09:45 (16)	07:20	07:10		19:34 (5)	06:08	06:46 (8)	05:29
	16:50	106	15:57 (14)	17:40	16:07 (14)	18:31	20:24	11	19:45 (4)	21:14	97	20:20 (6)
7	08:49		09:37 (16)	08:14	09:47 (16)	07:18	07:08		19:34 (5)	06:06	06:45 (8)	05:28
	16:51	106	15:58 (14)	17:42	16:59 (13)	18:33	20:26	13	19:47 (4)	21:16	99	20:20 (6)
8	08:49		09:37 (16)	08:13	09:51 (16)	07:16	07:05		19:33 (5)	06:04	06:43 (8)	05:28
	16:52	106	16:01 (14)	17:44	17:01 (13)	18:35	20:28	16	19:49 (5)	21:18	101	20:19 (6)
9	08:49		09:36 (16)	08:11	16:56 (13)	07:14	07:03		19:33 (5)	06:02	06:42 (8)	05:27
	16:54	106	16:02 (14)	17:46	17:03 (13)	18:37	20:29	18	19:51 (5)	21:19	103	20:19 (6)
10	08:48		09:35 (16)	08:09	16:56 (13)	07:11	07:01		19:33 (5)	06:01	06:40 (8)	05:27
	16:55	104	16:03 (14)	17:48	17:05 (13)	18:38	20:31	19	19:52 (5)	21:21	105	20:19 (6)
11	08:47		09:34 (16)	08:07	16:56 (13)	07:09	06:59		19:32 (5)	05:59	06:39 (8)	05:26
	16:56	104	16:05 (14)	17:50	17:07 (13)	18:40	20:33	21	19:53 (5)	21:22	106	20:19 (6)
12	08:46		09:33 (16)	08:05	16:56 (13)	07:07	06:56		19:33 (5)	05:57	06:37 (8)	05:26
	16:58	102	16:06 (14)	17:52	17:09 (13)	18:42	20:34	22	19:55 (5)	21:24	107	20:18 (6)
13	08:46		09:32 (16)	08:04	16:56 (13)	07:05	06:54		19:33 (5)	05:56	06:36 (8)	05:26
	16:59	94	16:08 (14)	17:53	17:11 (13)	18:44	20:36	23	19:56 (5)	21:26	109	20:18 (6)
14	08:45		09:31 (16)	08:02	16:56 (13)	07:02	06:52		19:34 (5)	05:54	06:34 (8)	05:25
	17:01	93	16:10 (14)	17:55	17:13 (13)	18:45	20:38	24	19:58 (5)	21:27	110	20:17 (6)
15	08:44		09:30 (16)	08:00	16:57 (13)	07:00	06:50		19:34 (5)	05:53	06:34 (8)	05:25
	17:02	86	16:12 (14)	17:57	17:15 (13)	18:47	20:39	26	20:00 (6)	21:29	110	20:17 (6)
16	08:43		09:30 (16)	07:58	16:58 (13)	06:58	06:48		19:36 (5)	05:51	06:34 (8)	05:25
	17:04	83	16:14 (14)	17:59	17:18 (13)	18:49	20:41	25	20:01 (6)	21:30	109	20:16 (6)
17	08:43		09:30 (16)	07:56	16:58 (13)	06:56	06:46		19:37 (5)	05:50	06:33 (8)	05:25
	17:05	86	16:16 (14)	18:01	17:19 (13)	18:50	20:43	26	20:03 (6)	21:32	108	20:15 (6)
18	08:42		09:30 (16)	07:54	16:59 (13)	06:53	06:43		19:37 (6)	05:48	06:33 (8)	05:25
	17:07	87	16:18 (14)	18:03	17:17 (13)	18:52	20:44	28	20:05 (6)	21:33	108	20:15 (6)
19	08:41		09:31 (16)	07:52	17:01 (13)	06:51	06:41		19:35 (6)	05:47	06:33 (8)	05:25
	17:09	88	16:19 (14)	18:04	17:16 (13)	18:54	20:46	31	20:06 (6)	21:35	106	20:14 (6)
20	08:40		09:31 (16)	07:50	17:04 (13)	06:49	06:39		19:34 (6)	05:46	06:33 (8)	05:25
	17:10	86	16:18 (14)	18:06	17:13 (13)	18:56	20:48	34	20:08 (6)	21:36	106	20:14 (6)
21	08:39		09:31 (16)	07:48		06:46	06:37		19:33 (6)	05:44	06:33 (8)	05:25
	17:12	87	16:19 (14)	18:08		06:44	06:35	36	20:09 (6)	21:37	104	20:13 (6)
22	08:37		09:32 (16)	07:46	17:29 (12)	06:44	06:35		19:31 (6)	05:43	06:32 (8)	05:25
	17:14	87	16:20 (14)	18:10	17:30 (12)	18:59	20:51	40	20:11 (6)	21:39	104	20:12 (6)
23	08:36		09:32 (16)	07:44	17:29 (12)	06:42	06:33		19:30 (6)	05:42	06:32 (8)	05:26
	17:15	86	16:19 (14)	18:12	17:31 (12)	19:01	20:53	42	20:12 (6)	21:40	102	20:11 (6)
24	08:35		09:33 (16)	07:42	17:29 (12)	06:40	06:31		19:29 (6)	05:40	06:32 (8)	05:26
	17:17	86	16:20 (14)	18:13	17:33 (12)	19:02	20:55	45	20:14 (6)	21:42	100	20:10 (6)
25	08:34		09:33 (16)	07:40	17:30 (12)	06:37	06:29		19:28 (6)	05:39	06:31 (8)	05:26
	17:19	83	16:19 (14)	18:15	17:35 (12)	19:04	20:56	47	20:15 (6)	21:43	100	20:10 (6)
26	08:33		09:34 (16)	07:38	17:32 (12)	06:35	06:27		19:28 (6)	05:38	06:31 (8)	05:27
	17:21	83	16:20 (14)	18:17	17:37 (12)	19:06	20:58	49	20:17 (6)	21:44	98	20:09 (6)
27	08:31		09:34 (16)	07:35	17:35 (12)	06:33	06:25		19:27 (6)	05:37	06:32 (8)	05:27
	17:22	81	16:19 (14)	18:19	17:39 (12)	19:07	21:00	51	20:18 (6)	21:45	96	20:09 (6)
28	08:30		09:34 (16)	07:33		06:30	06:23		19:26 (6)	05:36	06:32 (8)	05:28
	17:24	80	16:18 (14)	18:21		06:28	06:21	54	20:20 (6)	21:47	93	20:07 (6)
29	08:28		09:35 (16)			07:28	06:21		06:58 (8)	05:35	06:32 (8)	05:28
	17:26	78	16:19 (14)			07:26	06:19	69	20:20 (6)	21:48	91	20:06 (6)
30	08:27		09:36 (16)			07:26	06:19		06:57 (8)	05:34	06:32 (8)	05:29
	17:28	75	16:18 (14)			07:23	06:17	76	20:21 (6)	21:49	90	21:02 (21)
31	08:26		09:36 (16)			07:23	06:17		05:33		06:32 (8)	05:28
	17:30	72	16:17 (14)			07:23	06:17		21:50		21:03 (21)	
Potential sun hours	260		278		367	416	869		484		497	2405
Total, worst case	2857		557				0,38		3088			0,38
Sun reduction	0,18		0,27				0,97		0,43			0,97
Oper. time red.	0,97		0,64				0,57		0,61			0,64
Wind dir. red.	0,64		0,17				0,22		0,26			0,24
Total reduction	0,12		94				187		795			574
Total, real	333											

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Licensed user:

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Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (11)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October			November			December		
1	05:29		06:38 (8)	06:05		06:48 (8)	06:55		19:32 (5)	07:43		07:36		16:25 (13)	08:27		09:16 (16)	
	22:05	81	21:17 (21)	21:34	106	20:28 (6)	20:32	21	19:53 (5)	19:24		17:18	9	16:34 (13)	16:38	103	15:47 (14)	
2	05:30		06:39 (8)	06:07		06:50 (8)	06:56		19:31 (5)	07:45		07:38		16:26 (13)	08:28		09:18 (16)	
	22:05	80	21:17 (21)	21:32	105	20:29 (6)	20:30	19	19:50 (5)	19:21		17:16	6	16:32 (13)	16:38	104	15:46 (14)	
3	05:31		06:38 (8)	06:08		06:51 (8)	06:58		19:31 (5)	07:46		07:40		09:20 (16)	08:29		09:19 (16)	
	22:05	79	21:16 (21)	21:31	104	20:29 (6)	20:28	18	19:49 (5)	19:19		17:14	18	16:30 (13)	16:37	104	15:45 (14)	
4	05:31		06:39 (8)	06:10		06:52 (8)	06:59		19:30 (5)	07:48		07:42		09:17 (16)	08:31		09:21 (16)	
	22:04	78	21:16 (21)	21:29	103	20:29 (6)	20:26	16	19:46 (5)	19:17		17:13	22	16:28 (13)	16:36	106	15:45 (14)	
5	05:32		06:39 (8)	06:12		06:54 (8)	07:01		19:31 (5)	07:50		07:43		09:15 (16)	08:32		09:22 (16)	
	22:04	78	21:16 (21)	21:27	100	20:30 (6)	20:23	13	19:44 (4)	19:14		17:11	35	15:37 (14)	16:36	107	15:44 (14)	
6	05:33		06:40 (8)	06:13		06:55 (8)	07:03		19:30 (5)	07:51		07:45		09:13 (16)	08:33		09:24 (16)	
	22:03	76	21:15 (21)	21:25	98	20:29 (6)	20:21	11	19:41 (4)	19:12		17:09	45	15:41 (14)	16:35	106	15:44 (14)	
7	05:34		06:40 (8)	06:15		06:57 (8)	07:04		19:31 (5)	07:53		07:47		09:12 (16)	08:35		09:25 (16)	
	22:03	75	21:15 (21)	21:24	96	20:30 (6)	20:19	9	19:40 (4)	19:10		17:07	53	15:43 (14)	16:35	105	15:43 (14)	
8	05:35		06:39 (8)	06:16		06:58 (8)	07:06		19:31 (4)	07:55		07:49		09:10 (16)	08:36		09:27 (16)	
	22:02	76	21:14 (21)	21:22	93	20:30 (6)	20:17	6	19:37 (4)	19:08		17:06	59	15:45 (14)	16:35	105	15:43 (14)	
9	05:36		06:40 (8)	06:18		06:59 (8)	07:07		19:30 (4)	07:56		07:50		09:10 (16)	08:37		09:28 (16)	
	22:01	73	21:13 (21)	21:20	90	20:29 (6)	20:14	5	19:35 (4)	19:05		17:04	63	15:46 (14)	16:34	105	15:42 (14)	
10	05:37		06:40 (8)	06:19		07:01 (8)	07:09		19:29 (4)	07:58		07:52		09:09 (16)	08:38		09:29 (16)	
	22:01	78	21:13 (21)	21:18	87	20:29 (6)	20:12	3	19:32 (4)	19:03		17:03	68	15:48 (14)	16:34	103	15:41 (14)	
11	05:38		06:40 (8)	06:21		07:02 (8)	07:11		19:29 (4)	08:00		07:54		09:08 (16)	08:39		09:30 (16)	
	22:00	82	21:12 (21)	21:16	83	20:29 (6)	20:10	2	19:30 (4)	19:01		17:01	72	15:49 (14)	16:34	103	15:41 (14)	
12	05:39		06:40 (8)	06:23		07:04 (8)	07:12			08:01		07:56		09:08 (16)	08:40		09:31 (16)	
	21:59	88	21:12 (21)	21:14	79	20:29 (6)	20:07			18:59		16:59	75	15:50 (14)	16:34	103	15:41 (14)	
13	05:40		06:40 (8)	06:24		07:05 (8)	07:14			08:03		07:57		09:07 (16)	08:41		09:32 (16)	
	21:58	88	21:11 (21)	21:12	74	20:28 (6)	20:05			18:57		16:58	77	15:50 (14)	16:34	100	15:40 (14)	
14	05:41		06:41 (8)	06:26		07:07 (8)	07:15			08:05		07:59		09:07 (16)	08:42		09:33 (16)	
	21:57	89	20:14 (6)	21:10	68	20:28 (6)	20:03			18:54		16:57	80	15:51 (14)	16:34	100	15:40 (14)	
15	05:42		06:41 (8)	06:27		19:34 (6)	07:17			08:06	18:06 (12)	08:01		09:07 (16)	08:43		09:34 (16)	
	21:56	91	20:15 (6)	21:08	53	20:27 (6)	20:01		18:52	5	18:11 (12)	16:55	81	15:52 (14)	16:34	101	15:40 (14)	
16	05:43		06:41 (8)	06:29		19:35 (6)	07:19		08:08		18:04 (12)	08:03		09:07 (16)	08:44		09:35 (16)	
	21:55	94	20:17 (6)	21:07	50	20:25 (6)	19:58		18:50	5	18:09 (12)	16:54	83	15:53 (14)	16:34	100	15:40 (14)	
17	05:45		06:41 (8)	06:30		19:34 (6)	07:20		08:10		18:01 (12)	08:04		09:07 (16)	08:45		09:36 (16)	
	21:54	96	20:18 (6)	21:04	49	20:23 (6)	19:56		18:48	5	18:06 (12)	16:52	84	15:53 (14)	16:34	100	15:41 (14)	
18	05:46		06:41 (8)	06:32		19:35 (6)	07:22		08:12		18:00 (12)	08:06		09:07 (16)	08:46		09:37 (16)	
	21:53	99	20:19 (6)	21:02	47	20:22 (6)	19:54		18:46	3	18:03 (12)	16:51	86	15:54 (14)	16:35	99	15:41 (14)	
19	05:47		06:42 (8)	06:34		19:35 (6)	07:23		08:13		18:00 (12)	08:08		09:07 (16)	08:46		09:38 (16)	
	21:52	101	20:21 (6)	21:00	44	20:19 (6)	19:51		18:44	2	18:01 (12)	16:50	86	15:54 (14)	16:35	99	15:42 (14)	
20	05:48		06:42 (8)	06:35		19:35 (6)	07:25		08:15			08:09		09:07 (16)	08:47		09:38 (16)	
	21:51	102	20:21 (6)	20:58	42	20:17 (6)	19:49		18:42			16:49	87	15:55 (14)	16:35	99	15:41 (14)	
21	05:50		06:42 (8)	06:37		19:36 (6)	07:27		08:17			08:11		09:06 (16)	08:47		09:39 (16)	
	21:50	103	20:22 (6)	20:56	39	20:15 (6)	19:47		18:40			16:47	87	15:54 (14)	16:36	99	15:42 (14)	
22	05:51		06:42 (8)	06:38		19:36 (6)	07:28		08:19	17:34 (13)	08:13			09:07 (16)	08:48		09:39 (16)	
	21:48	105	20:23 (6)	20:54	37	20:13 (6)	19:44		18:38	10	17:44 (13)	16:46	86	15:54 (14)	16:36	99	15:42 (14)	
23	05:52		06:42 (8)	06:40		19:38 (6)	07:30		08:20		17:31 (13)	08:14		09:07 (16)	08:49		09:40 (16)	
	21:47	106	20:23 (6)	20:52	33	20:11 (6)	19:42		18:35	16	17:47 (13)	16:45	88	15:55 (14)	16:37	99	15:43 (14)	
24	05:54		06:43 (8)	06:42		19:38 (6)	07:32		08:22		17:29 (13)	08:16		09:07 (16)	08:49		09:40 (16)	
	21:46	107	20:25 (6)	20:50	31	20:09 (6)	19:40		18:33	19	17:48 (13)	16:44	87	15:55 (14)	16:37	99	15:44 (14)	
25	05:55		06:43 (8)	06:43		19:40 (6)	07:33		07:24		16:28 (13)	08:18		09:08 (16)	08:49		09:40 (16)	
	21:44	108	20:25 (6)	20:48	27	20:07 (6)	19:37		17:31	21	16:49 (13)	16:43	86	15:54 (14)	16:38	99	15:44 (14)	
26	05:57		06:43 (8)	06:45		19:39 (5)	07:35		07:26		16:27 (13)	08:19		09:09 (16)	08:50		09:40 (16)	
	21:43	109	20:26 (6)	20:46	26	20:05 (6)	19:35		17:29	20	16:47 (13)	16:42	83	15:53 (14)	16:38	99	15:44 (14)	
27	05:58		06:44 (8)	06:47		19:37 (5)	07:36		07:27		16:26 (13)	08:21		09:10 (16)	08:50		09:41 (16)	
	21:42	109	20:26 (6)	20:43	26	20:03 (6)	19:33		17:27	18	16:44 (13)	16:41	84	15:52 (14)	16:39	101	15:46 (14)	
28	06:00		06:45 (8)	06:48		19:35 (5)	07:38		07:29		16:26 (13)	08:22		09:11 (16)	08:50		09:41 (16)	
	21:40	109	20:27 (6)	20:41	26	20:01 (6)	19:30		17:26	16	16:42 (13)	16:40	93	15:50 (14)	16:40	101	15:47 (14)	
29	06:01		06:45 (8)	06:50		19:34 (5)	07:40		07:31		16:26 (13)	08:24		09:13 (16)	08:50		09:41 (16)	
	21:39	109	20:27 (6)	20:39	25	19:59 (5)	19:28		17:24	14	16:40 (13)	16:40	94	15:49 (14)	16:41	101	15:48 (14)	
30	06:02		06:45 (8)	06:51		19:33 (5)	07:41		07:33		16:25 (13)	08:25		09:15 (16)	08:50		09:41 (16)	
	21:37	108	20:27 (6)	20:37	23	19:56 (5)	19:26		17:22	13	16:38 (13)	16:39	101	15:48 (14)	16:42	102	15:49 (14)	
31	06:04		06:47 (8)	06:53		19:32 (5)			07:34		16:25 (13)				08:50		09:40 (16)	
	21:36	107	20:28 (6)	20:35	23	19:55 (5)			17:20	11	16:36 (13)				16:43	103	15:49 (14)	
Potential sun hours	501			453			381			332			267			245		
Total, worst case		2884			1887			123		178			2078			3154		
Sun reduction		0,40			0,42			0,36		0,31			0,22			0,16		
Oper. time red.		0,97			0,97			0,97		0,97			0,97			0,97		
Wind dir. red.		0,62			0,59			0,59		0,68			0,63			0,66		
Total reduction		0,24			0,24			0,21		0,20			0,14			0,11		
Total, real		702			459			26		36			282			337		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Licensed user:

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Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (12)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:50	08:24	16:21 (22)	07:31	14:43 (15)	07:21
2	16:44	17:31	25	16:46 (22)	18:22	124
3	16:45	17:33	27	16:48 (22)	18:24	126
4	16:46	17:35	29	16:50 (22)	18:26	128
5	16:47	17:37	31	16:52 (22)	18:28	135
6	16:48	17:39	30	16:51 (22)	18:30	156
7	16:49	17:41	57	16:52 (22)	18:31	171
8	16:50	17:42	66	16:52 (22)	18:33	185
9	16:51	17:43	75	16:51 (22)	18:35	195
10	16:52	17:44	80	16:51 (22)	18:37	205
11	16:53	17:45	84	16:50 (22)	18:38	213
12	16:54	17:46	88	16:49 (22)	18:40	222
13	16:55	17:47	90	16:47 (22)	18:42	228
14	16:56	17:48	90	16:45 (22)	18:44	235
15	16:57	17:49	88	16:42 (22)	18:45	242
16	16:58	17:50	83	16:39 (22)	18:46	247
17	16:59	17:51	87	16:36 (22)	18:47	252
18	17:00	17:52	91	16:33 (22)	18:48	257
19	17:01	17:53	95	16:30 (22)	18:49	260
20	17:02	17:54	99	16:27 (22)	18:50	264
21	17:03	17:55	101	16:24 (22)	18:51	268
22	17:04	17:56	105	16:21 (22)	18:52	271
23	17:05	17:57	107	16:18 (22)	18:53	273
24	17:06	17:58	110	16:15 (22)	18:54	276
25	17:07	17:59	113	16:12 (22)	18:55	275
26	17:08	18:00	115	16:09 (22)	18:56	274
27	17:09	18:01	117	16:06 (22)	18:57	268
28	17:10	18:02	120	16:03 (22)	18:58	261
29	17:11	18:03	122	16:00 (22)	18:59	259
30	17:12	18:04		15:57 (22)	19:00	257
31	17:13	18:05		15:54 (22)	19:01	252
Potential sun hours	260	278	367	415	484	497
Total, worst case	119	2325	7026	4913	802	
Sun reduction	0,18	0,27	0,30	0,38	0,43	
Oper. time red.	0,97	0,97	0,97	0,97	0,97	
Wind dir. red.	0,69	0,69	0,65	0,65	0,66	
Total reduction	0,12	0,18	0,19	0,24	0,27	
Total, real	15	424	1338	1200	220	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (12)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:05	16:54 (15)	06:55	08:31 (16)	07:43	08:25 (16)	07:36	14:48 (15)	08:27	
	22:05		21:34	20:50 (5)	20:32	195	17:43 (15)	19:24	232	18:43 (14)	17:18	83
2	05:30		06:07	16:50 (15)	06:56	08:30 (16)	07:45	08:27 (16)	07:38	14:51 (15)	08:28	
	22:05		21:32	20:49 (5)	20:30	198	17:43 (15)	19:21	223	18:41 (14)	17:16	78
3	05:31		06:08	16:45 (15)	06:58	08:29 (16)	07:46	08:27 (16)	07:40	14:55 (15)	08:29	
	22:05		21:31	20:47 (5)	20:28	202	17:44 (15)	19:19	216	18:38 (14)	17:14	73
4	05:32		06:10	16:41 (15)	06:59	08:28 (16)	07:48	08:29 (16)	07:42	14:59 (15)	08:31	
	22:04		21:29	17:21 (15)	20:26	205	17:43 (15)	19:17	209	18:36 (14)	17:13	66
5	05:32		06:12	16:38 (15)	07:01	08:27 (16)	07:50	08:31 (16)	07:43	15:05 (15)	08:32	
	22:04		21:27	17:23 (15)	20:23	208	17:43 (15)	19:14	200	18:34 (14)	17:11	55
6	05:33		06:13	16:35 (15)	07:03	08:26 (16)	07:51	08:34 (16)	07:45	15:52 (22)	08:33	
	22:03		21:25	17:25 (15)	20:21	211	17:43 (15)	19:12	190	18:32 (14)	17:09	30
7	05:34		06:15	16:32 (15)	07:04	08:25 (16)	07:53	08:35 (16)	07:47	15:52 (22)	08:35	
	22:03		21:24	17:27 (15)	20:19	214	17:43 (15)	19:10	179	18:29 (14)	17:07	30
8	05:35		06:16	16:29 (15)	07:06	08:24 (16)	07:55	08:39 (16)	07:49	15:52 (22)	08:36	
	22:02		21:22	17:28 (15)	20:17	215	17:43 (15)	19:08	164	18:27 (14)	17:06	28
9	05:36		06:18	16:26 (15)	07:07	08:24 (16)	07:56	08:44 (16)	07:50	15:52 (22)	08:37	
	22:01		21:20	17:29 (15)	20:14	217	17:43 (15)	19:05	147	17:24 (15)	17:04	27
10	05:37		06:19	16:24 (15)	07:09	08:23 (16)	07:58	15:15 (15)	07:52	15:52 (22)	08:38	
	22:01		21:18	17:31 (15)	20:12	229	18:46 (14)	19:03	128	17:23 (15)	17:03	25
11	05:38		06:21	16:21 (15)	07:11	08:23 (16)	08:00	15:15 (15)	07:54	15:52 (22)	08:39	
	22:00		21:16	17:32 (15)	20:10	239	18:50 (14)	19:01	126	17:21 (15)	17:01	23
12	05:39		06:23	16:19 (15)	07:12	08:22 (16)	08:01	15:16 (15)	07:56	15:53 (22)	08:40	
	21:59		21:14	20:33 (4)	20:07	246	18:52 (14)	18:59	125	17:21 (15)	16:59	20
13	05:40		06:24	16:16 (15)	07:14	08:22 (16)	08:03	15:17 (15)	07:57	15:53 (22)	08:41	
	21:58		21:12	20:30 (4)	20:05	251	18:54 (14)	18:57	123	17:20 (15)	16:58	19
14	05:41		06:26	16:14 (15)	07:15	08:22 (16)	08:05	15:18 (15)	07:59	15:54 (22)	08:42	
	21:57		21:10	20:29 (4)	20:03	256	18:56 (14)	18:54	121	17:19 (15)	16:57	16
15	05:42		06:27	16:11 (15)	07:17	08:21 (16)	08:06	15:19 (15)	08:01	15:55 (22)	08:43	
	21:56		21:08	20:27 (4)	20:01	259	18:56 (14)	18:52	118	17:17 (15)	16:55	13
16	05:43	20:52 (5)	06:29	16:09 (15)	07:19	08:21 (16)	08:08	15:20 (15)	08:03	15:56 (22)	08:44	
	21:55	8	21:00 (5)	21:06	88	17:37 (15)	19:58	261	18:57 (14)	18:50	116	17:16 (15)
17	05:45	20:50 (5)	06:30	16:06 (15)	07:20	08:20 (16)	08:10	15:20 (15)	08:04	15:57 (22)	08:45	
	21:54	11	21:01 (5)	21:04	91	17:37 (15)	19:56	263	18:57 (14)	18:48	114	17:14 (15)
18	05:46	20:49 (5)	06:32	16:04 (15)	07:22	08:21 (16)	08:12	15:21 (15)	08:06	15:58 (22)	08:46	
	21:53	14	21:03 (5)	21:02	94	17:38 (15)	19:54	271	19:05 (13)	18:46	112	17:13 (15)
19	05:47	20:49 (5)	06:34	08:58 (16)	07:23	08:20 (16)	08:13	15:23 (15)	08:08	15:59 (22)	08:46	
	21:52	16	21:05 (5)	21:00	113	17:39 (15)	19:51	276	19:07 (13)	18:44	109	17:12 (15)
20	05:48	20:48 (5)	06:35	08:52 (16)	07:25	08:20 (16)	08:15	15:24 (15)	08:09		16:47	
	21:51	17	21:05 (5)	20:58	125	17:39 (15)	19:49	276	19:08 (13)	18:42	106	17:10 (15)
21	05:50	20:47 (5)	06:37	08:50 (16)	07:27	08:21 (16)	08:17	15:25 (15)	08:11		16:47	
	21:50	17	21:04 (5)	20:56	134	17:40 (15)	19:47	275	19:07 (12)	18:40	104	17:09 (15)
22	05:51	20:46 (5)	06:38	08:46 (16)	07:28	08:20 (16)	08:19	15:27 (15)	08:13		16:48	
	21:48	17	21:03 (5)	20:54	143	17:40 (15)	19:44	273	19:04 (12)	18:38	100	17:07 (15)
23	05:52	20:45 (5)	06:40	08:45 (16)	07:30	08:21 (16)	08:20	15:28 (15)	08:14		16:48	
	21:47	16	21:01 (5)	20:52	150	17:41 (15)	19:42	268	19:02 (12)	18:35	98	17:06 (15)
24	05:54	20:45 (5)	06:42	08:42 (16)	07:32	08:20 (16)	08:22	15:30 (15)	08:16		16:49	
	21:46	16	21:01 (5)	20:50	156	17:41 (15)	19:40	266	18:59 (12)	18:33	94	17:04 (15)
25	05:55	20:45 (5)	06:43	08:41 (16)	07:33	08:21 (16)	07:24	14:32 (15)	08:18		16:49	
	21:44	14	20:59 (5)	20:48	162	17:41 (15)	19:37	262	18:57 (12)	17:31	90	16:02 (15)
26	05:57	20:44 (5)	06:45	08:38 (16)	07:35	08:22 (16)	07:26	14:34 (15)	08:19		16:50	
	21:43	14	20:58 (5)	20:46	169	17:41 (15)	19:35	257	18:55 (13)	17:29	86	16:00 (15)
27	05:58	20:44 (5)	06:47	08:37 (16)	07:36	08:22 (16)	07:27	14:36 (15)	08:21		16:50	
	21:42	12	20:56 (5)	20:43	173	17:42 (15)	19:33	252	18:52 (13)	17:27	82	15:58 (15)
28	06:00	20:44 (5)	06:48	08:35 (16)	07:38	08:23 (16)	07:29	14:38 (15)	08:22		16:50	
	21:40	12	20:56 (5)	20:41	179	17:42 (15)	19:30	248	18:50 (13)	17:26	89	16:13 (22)
29	06:01	20:44 (5)	06:50	08:34 (16)	07:40	08:24 (16)	07:31	14:40 (15)	08:24		16:50	
	21:39	10	20:54 (5)	20:39	184	17:43 (15)	19:28	242	18:48 (13)	17:24	90	16:15 (22)
30	06:02	20:43 (5)	06:51	08:33 (16)	07:41	08:24 (16)	07:33	14:42 (15)	08:25		16:50	
	21:37	9	20:52 (5)	20:37	186	17:42 (15)	19:26	237	18:45 (13)	17:22	90	16:17 (22)
31	06:04	20:44 (5)	06:53	08:32 (16)			07:34	14:45 (15)				
	21:35	8	20:52 (5)	20:35	192	17:43 (15)		17:20	87	16:19 (22)		
Potential sun hours	501		453		381		332		267		245	
Total, worst case	211		3205		7272		4068		614			
Sun reduction	0,40		0,42		0,36		0,31		0,22			
Oper. time red.	0,97		0,97		0,97		0,97		0,97			
Wind dir. red.	0,56		0,67		0,64		0,68		0,69			
Total reduction	0,22		0,27		0,22		0,20		0,15			
Total, real	46		879		1635		821		91			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (13)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	07:57 (19) 06:17	05:32 21:52
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:54 (19) 06:15	21:52 05:31
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:52 (19) 06:13	21:53 05:31
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	07:50 (19) 06:11	21:54 05:30
5	08:50 16:49	08:18 17:39	07:23 18:30	07:12 20:23	07:48 (19) 06:10	21:55 05:29
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	07:45 (19) 06:08	21:56 05:29
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	07:43 (19) 06:06	21:57 05:28
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	07:41 (19) 06:04	21:58 05:28
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	07:39 (19) 06:03	21:59 05:27
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	07:38 (19) 06:01	21:59 05:27
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	07:36 (19) 05:59	22:00 05:26
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	07:34 (19) 05:57	22:01 05:26
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36	07:32 (19) 05:55	22:02 05:26
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38	07:30 (19) 05:53	22:02 05:25
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	07:28 (19) 05:51	22:03 05:25
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	07:26 (19) 05:49	22:03 05:25
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43	07:24 (19) 05:47	22:04 05:25
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45	07:22 (19) 05:45	22:04 05:25
19	08:41 17:09	07:52 18:05	06:51 18:54	06:41 20:46	07:20 (19) 05:43	22:05 05:25
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	07:18 (19) 05:41	22:05 05:25
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50	07:16 (19) 05:39	22:06 05:25
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51	07:14 (19) 05:37	22:06 05:26
23	08:36 17:15	07:44 18:12	06:42 19:01	06:33 20:53	07:12 (19) 05:35	22:06 05:26
24	08:35 17:17	07:42 18:14	06:40 19:02	06:31 20:55	07:10 (19) 05:33	22:06 05:26
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56	07:08 (19) 05:31	22:06 05:26
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	07:06 (19) 05:29	22:06 05:27
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	07:04 (19) 05:27	22:06 05:27
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	07:02 (19) 05:25	22:06 05:28
29	08:29 17:26		06:28 20:11	06:21 21:03	07:00 (19) 05:23	22:06 05:29
30	08:27 17:28		06:26 20:13	06:19 21:05	06:58 (19) 05:21	22:06 05:29
31	08:26 17:30		06:24 20:14	06:17 21:06	06:56 (19) 05:19	22:06 05:29
Potential sun hours	260	278	367	416	484	497
Total, worst case		53	192	635		
Sun reduction		0,27	0,30	0,38		
Oper. time red.		0,97	0,97	0,97		
Wind dir. red.		0,56	0,55	0,61		
Total reduction		0,15	0,16	0,23		
Total, real		8	31	144		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (13)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06	06:06 21:34	06:55 20:33	07:37 (19) 19:24	07:43 19:24	08:26 (20) 17:18
2	05:30 22:05	06:07 21:32	06:56 20:30	07:36 (19) 19:21	07:45 19:21	08:25 (20) 17:16
3	05:31 22:05	06:09 21:31	06:58 20:28	07:37 (19) 19:19	07:46 19:19	08:25 (20) 17:14
4	05:32 22:04	06:10 21:29	07:00 20:26	07:38 (19) 19:17	07:48 19:17	08:26 (20) 17:13
5	05:32 22:04	06:12 21:27	07:01 20:24	07:40 (19) 19:15	07:50 19:15	08:28 (20) 17:11
6	05:33 22:03	06:13 21:26	07:03 20:21	07:41 (19) 19:12	07:51 19:12	08:30 (20) 17:09
7	05:34 22:03	06:15 21:24	07:04 20:19	07:43 (19) 19:10	07:53 19:10	08:32 (20) 17:08
8	05:35 22:02	06:16 21:22	07:06 20:17	07:44 (19) 19:08	07:55 19:08	08:33 (20) 17:06
9	05:36 22:02	06:18 21:20	07:08 20:14	07:46 (19) 19:06	07:56 19:06	08:35 (20) 17:04
10	05:37 22:01	06:19 21:18	07:09 20:12	07:47 (19) 19:03	07:58 19:03	08:37 (20) 17:03
11	05:38 22:00	06:21 21:16	07:11 20:10	07:49 (19) 19:01	08:00 19:01	08:39 (20) 17:01
12	05:39 21:59	06:23 21:15	07:12 20:08	07:51 (19) 18:59	08:02 18:59	08:43 (20) 17:00
13	05:40 21:58	06:24 21:13	07:14 20:05	08:03 18:57	08:03 18:57	08:44 (20) 16:58
14	05:41 21:58	06:26 21:11	07:16 20:03	08:05 18:55	08:05 18:55	08:46 (20) 16:57
15	05:42 21:57	06:27 21:09	07:17 20:01	08:07 18:52	08:07 18:52	08:48 (20) 16:55
16	05:44 21:56	06:29 21:07	07:19 19:58	08:08 18:50	08:08 18:50	08:50 (20) 16:54
17	05:45 21:54	06:31 21:05	07:20 19:56	08:10 18:48	08:10 18:48	08:52 (20) 16:52
18	05:46 21:53	06:32 21:03	07:22 19:54	08:12 18:46	08:12 18:46	08:54 (20) 16:51
19	05:47 21:52	06:34 21:01	07:24 19:51	08:13 18:44	08:13 18:44	08:56 (20) 16:50
20	05:49 21:51	06:35 20:59	07:25 19:49	08:15 18:42	08:15 18:42	08:58 (20) 16:49
21	05:50 21:50	06:37 20:56	07:27 19:47	08:17 18:40	08:17 18:40	08:60 (20) 16:48
22	05:51 21:49	06:39 20:54	07:28 19:44	08:19 18:38	08:19 18:38	08:62 (20) 16:46
23	05:53 21:47	06:40 20:52	07:30 19:42	08:20 18:36	08:20 18:36	08:64 (20) 16:45
24	05:54 21:46	06:42 20:50	07:32 19:40	08:22 18:34	08:22 18:34	08:66 (20) 16:44
25	05:55 21:45	06:43 20:48	07:33 19:37	08:24 18:32	08:24 18:32	08:68 (20) 16:43
26	05:57 21:43	06:45 20:46	07:35 19:35	08:26 18:30	08:26 18:30	08:70 (20) 16:42
27	05:58 21:42	06:47 20:44	07:37 19:33	08:28 18:28	08:28 18:28	08:72 (20) 16:41
28	06:00 21:40	06:48 20:41	07:38 19:31	08:30 18:26	08:30 18:26	08:74 (20) 16:40
29	06:01 21:39	06:50 20:39	07:40 19:28	08:31 (20) 18:24	08:31 (20) 18:24	08:76 (20) 16:39
30	06:03 21:37	06:51 20:37	07:41 19:26	08:33 (20) 18:22	08:33 (20) 18:22	08:78 (20) 16:38
31	06:04 21:36	06:53 20:35	07:37 (19) 18:13	07:35 17:20	07:35 17:20	08:17 (21) 16:37
Potential sun hours	501	453	381	332	267	245
Total, worst case		351	325	215		
Sun reduction		0,42	0,36	0,31		
Oper. time red.		0,97	0,97	0,97		
Wind dir. red.		0,61	0,61	0,55		
Total reduction		0,25	0,21	0,16		
Total, real		88	69	35		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (14)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	09:06 (21) 18:23	08:09 (20) 20:16	08:02 (19) 21:06	05:32 21:52
2	08:50 16:45	08:23 17:30	09:04 (21) 18:24	08:10 (20) 20:17	08:01 (19) 21:07	05:31 21:53
3	08:50 16:45	08:21 17:28	09:02 (21) 18:24	08:11 (20) 20:17	08:00 (19) 21:07	05:31 21:53
4	08:50 16:47	08:20 17:37	09:00 (21) 18:25	08:11 (20) 20:17	08:00 (19) 21:07	05:30 21:54
5	08:50 16:48	08:18 17:39	08:59 (21) 18:30	08:12 (20) 20:23	07:59 (19) 21:13	05:29 21:56
6	08:50 16:50	08:16 17:41	08:57 (21) 18:31	08:14 (20) 20:24	07:58 (19) 21:15	05:29 21:57
7	08:49 16:51	08:15 17:42	08:55 (21) 18:33	08:16 (20) 20:26	07:58 (19) 21:16	05:28 21:58
8	08:49 16:52	08:13 17:44	08:53 (21) 18:35	08:27 (20) 20:28	07:58 (19) 21:18	05:28 21:59
9	08:48 16:54	08:11 17:46	08:55 (21) 18:37	07:03 20:29	07:58 (19) 21:19	05:27 21:59
10	08:48 16:55	08:09 17:48	08:58 (21) 18:38	07:01 20:31	07:58 (19) 21:21	05:27 22:00
11	08:47 16:56	08:07 17:50	09:03 (21) 18:40	06:59 20:33	07:59 (19) 21:23	05:26 22:01
12	08:47 16:58	08:06 17:52	09:07 (21) 18:42	06:57 20:35	07:58 (19) 21:24	05:26 22:02
13	08:46 16:59	08:04 17:53	09:05 (21) 18:44	06:54 20:36	07:58 (19) 21:26	05:26 22:02
14	08:45 17:01	08:02 17:55	09:02 (21) 18:45	06:52 20:38	07:59 (19) 21:27	05:25 22:03
15	08:44 17:02	08:00 17:57	09:00 (21) 18:47	06:50 20:40	08:00 (19) 21:29	05:25 22:03
16	08:44 17:04	07:58 17:59	09:04 (21) 18:49	06:48 20:41	08:00 (19) 21:30	05:25 22:04
17	08:43 17:05	07:56 18:01	09:06 (21) 18:51	06:46 20:43	08:01 (19) 21:32	05:25 22:04
18	08:42 17:07	07:54 18:03	09:08 (21) 18:52	06:43 20:45	08:03 (19) 21:33	05:25 22:05
19	08:41 17:09	07:52 18:04	09:10 (21) 18:54	06:41 20:46	08:04 (19) 21:35	05:25 22:05
20	08:40 17:10	07:50 18:06	09:12 (21) 18:56	06:39 20:48	08:06 (19) 21:36	05:25 22:05
21	08:39 17:12	07:48 18:08	09:14 (21) 18:57	06:37 20:50	08:08 (19) 21:38	05:25 22:06
22	08:38 17:14	07:46 18:10	09:16 (21) 18:59	06:35 20:51	08:11 (19) 21:39	05:26 22:06
23	08:36 17:15	07:44 18:12	09:18 (21) 19:01	06:33 20:53	08:23 (19) 21:40	05:26 22:06
24	08:35 17:17	07:42 18:14	09:20 (21) 19:02	06:31 20:55	05:40 21:42	05:26 22:06
25	08:34 17:19	07:40 18:15	09:22 (21) 19:04	06:29 20:56	05:39 21:43	05:26 22:06
26	08:33 17:21	07:38 18:17	09:24 (21) 19:06	06:27 20:58	05:38 21:44	05:27 22:06
27	08:31 17:22	07:36 18:19	09:26 (21) 19:08	06:25 21:00	05:37 21:46	05:27 22:06
28	08:30 17:24	07:33 18:21	09:28 (21) 19:10	06:23 21:01	05:36 21:47	05:28 22:06
29	08:29 17:26	07:31 18:23	09:30 (21) 19:12	06:21 21:03	05:35 21:48	05:28 22:06
30	08:27 17:28	07:29 18:25	09:32 (21) 19:14	06:19 21:05	05:34 21:49	05:29 22:06
31	08:26 17:30	09:08 (21) 09:10 (21)	07:24 20:14	08:03 (19) 08:46 (19)	05:33 21:51	05:30 22:06
Potential sun hours	260	278	367	416	484	497
Total, worst case	2	256	432	859		505
Sun reduction	0,18	0,27	0,30	0,38		0,38
Oper. time red.	0,97	0,97	0,97	0,97		0,97
Wind dir. red.	0,57	0,56	0,58	0,60		0,57
Total reduction	0,10	0,15	0,17	0,22		0,21
Total, real	0	38	74	191		106

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 1: Enkele lijn overnachtingsplaatsen

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17-03-2014 14:52 / 12

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:11/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (14)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	754	1.470	1.147	792	522	542	8.525

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29	20:35 (17)	06:06		06:55	07:58 (19)	07:43		07:36	08:27 (21)	08:27	
	22:05	17	20:52 (17)	21:34	20:33	44	08:42 (19)	19:24	17:18	7	08:34 (21)	16:38
2	05:30	20:37 (17)	06:07		06:56	07:56 (19)	07:45		07:38	08:24 (21)	08:28	
	22:05	14	20:51 (17)	21:32	20:30	46	08:42 (19)	19:21	17:16	12	08:36 (21)	16:38
3	05:31	20:40 (17)	06:09		06:58	07:56 (19)	07:46		07:40	08:23 (21)	08:30	
	22:05	10	20:50 (17)	21:31	20:28	46	08:42 (19)	19:19	17:14	15	08:38 (21)	16:37
4	05:32		06:10		07:00	07:55 (19)	07:48		07:42	08:25 (21)	08:31	
	22:04		21:29		20:26	47	08:42 (19)	19:17	17:13	14	08:39 (21)	16:36
5	05:32		06:12		07:01	07:55 (19)	07:50		07:43	08:27 (21)	08:32	
	22:04		21:27		20:24	47	08:42 (19)	19:15	17:11	13	08:40 (21)	16:36
6	05:33		06:13		07:03	07:54 (19)	07:51	08:55 (20)	07:45	08:29 (21)	08:34	
	22:03		21:26		20:21	47	08:41 (19)	19:12	09:01 (20)	11	08:40 (21)	16:35
7	05:34		06:15		07:04	07:55 (19)	07:53	08:51 (20)	07:47	08:31 (21)	08:35	
	22:03		21:24		20:19	46	08:41 (19)	19:10	09:05 (20)	10	08:41 (21)	16:35
8	05:35		06:16		07:06	07:54 (19)	07:55	08:48 (20)	07:49	08:33 (21)	08:36	
	22:02		21:22		20:17	46	08:40 (19)	19:08	09:06 (20)	8	08:41 (21)	16:35
9	05:36		06:18		07:08	07:54 (19)	07:56	08:46 (20)	07:51	08:35 (21)	08:37	
	22:02		21:20		20:14	46	08:40 (19)	19:06	09:08 (20)	6	08:41 (21)	16:34
10	05:37		06:19		07:09	07:54 (19)	07:58	08:45 (20)	07:52	08:37 (21)	08:38	
	22:01		21:18		20:12	45	08:39 (19)	19:03	09:09 (20)	4	08:41 (21)	16:34
11	05:38		06:21		07:11	07:54 (19)	08:00	08:44 (20)	07:54	08:39 (21)	08:39	
	22:00		21:16		20:10	44	08:38 (19)	19:01	09:10 (20)	2	08:41 (21)	16:34
12	05:39		06:23		07:12	07:55 (19)	08:01	08:43 (20)	07:56		08:40	
	21:59		21:15		20:08	43	08:38 (19)	18:59	09:09 (20)		16:34	
13	05:40		06:24		07:14	07:55 (19)	08:03	08:42 (20)	07:58		08:41	
	21:58		21:13		20:05	41	08:36 (19)	18:57	09:10 (20)		16:34	
14	05:41		06:26		07:16	07:56 (19)	08:05	08:44 (20)	07:59		08:42	
	21:57		21:11		20:03	39	08:35 (19)	18:55	09:10 (20)		16:34	
15	05:42		06:27		07:17	07:56 (19)	08:07	08:46 (20)	08:01		08:43	
	21:57		21:09		20:01	37	08:33 (19)	18:52	09:10 (20)		16:34	
16	05:44		06:29		07:19	07:57 (19)	08:08	08:48 (20)	08:03		08:44	
	21:56		21:07		19:58	35	08:32 (19)	18:50	09:10 (20)		16:34	
17	05:45		06:31		07:20	07:58 (19)	08:10	08:50 (20)	08:05		08:45	
	21:54		21:05		19:56	32	08:30 (19)	18:48	09:10 (20)		16:34	
18	05:46		06:32		07:22	08:00 (19)	08:12	08:51 (20)	08:06		08:46	
	21:53		21:03		19:54	28	08:28 (19)	18:46	09:08 (20)		16:35	
19	05:47		06:34		07:24	08:03 (19)	08:13	08:53 (20)	08:08		08:46	
	21:52		21:01		19:51	22	08:25 (19)	18:44	09:07 (20)		16:35	
20	05:49		06:35		07:25	08:05 (19)	08:15	08:55 (20)	08:10		08:47	
	21:51		20:58		19:49	16	08:21 (19)	18:42	09:07 (20)		16:35	
21	05:50		06:37		07:27		08:17	08:57 (20)	08:11		08:48	
	21:50		20:56	14	08:29 (19)		18:40	9	09:06 (20)		16:36	
22	05:51		06:39		07:28		08:19	08:59 (20)	08:13		08:48	
	21:49		20:54	20	08:32 (19)		18:38	5	09:04 (20)		16:36	
23	05:53		06:40		07:30		08:20	09:01 (20)	08:15		08:49	
	21:47		20:52	25	08:34 (19)		18:36	2	09:02 (20)		16:37	
24	05:54		06:42		07:32		08:22		08:16		08:49	
	21:46		20:50	29	08:36 (19)		18:34		16:44		16:37	
25	05:55		06:43		07:33		07:24		08:18		08:50	
	21:45		20:48	32	08:37 (19)		17:32		16:43		16:38	
26	05:57		06:45		07:35		07:26		08:19		08:50	
	21:43		20:46	35	08:39 (19)		17:30		16:42		16:39	
27	05:58		06:47		07:37		07:27		08:21		08:50	
	21:42		20:44	37	08:39 (19)		17:28		16:41		16:39	
28	06:00		06:48		07:38		07:29		08:22		08:50	
	21:40		20:41	40	08:41 (19)		17:26		16:40		16:40	
29	06:01		06:50		07:40		07:31		08:24		08:50	
	21:39		20:39	41	08:41 (19)		17:24		16:40		16:41	
30	06:03		06:51		07:41		07:33		08:25		08:51	
	21:37		20:37	43	08:42 (19)		17:22		16:39		16:42	
31	06:04		06:53		07:58 (19)		07:35				08:51	
	21:36		20:35	44	08:42 (19)		17:20				16:43	
Potential sun hours	501		453		381		332		267		245	
Total, worst case	41		360		797		315		102			
Sun reduction	0,40		0,42		0,36		0,31		0,22			
Oper. time red.	0,97		0,97		0,97		0,97		0,97			
Wind dir. red.	0,57		0,60		0,60		0,56		0,57			
Total reduction	0,22		0,24		0,21		0,17		0,12			
Total, real	9		88		166		52		12			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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17-03-2014 15:05 / 1

Licensed user:

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Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (20)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:51		10:16 (18)	08:24		09:06 (19)	07:31		08:08 (20)	07:21		06:17		06:59 (11)	05:32		06:28 (10)	
	16:44	100	14:41 (17)	17:31	6	09:12 (19)	18:23	13	08:21 (20)	20:16		21:06	38	07:37 (11)	21:52	104	20:43 (9)	
2	08:51		10:17 (18)	08:23		09:04 (19)	07:29		08:06 (20)	07:19		06:15		06:59 (11)	05:32		06:27 (10)	
	16:45	100	14:42 (17)	17:33	9	09:13 (19)	18:24	14	08:20 (20)	20:18		21:08	37	07:36 (11)	21:53	108	20:44 (9)	
3	08:50		10:18 (18)	08:21		09:02 (19)	07:27		08:08 (20)	07:17		06:13		06:59 (11)	05:31		06:27 (10)	
	16:46	99	14:42 (17)	17:35	11	09:13 (19)	18:26	9	08:17 (20)	20:19		21:10	36	07:35 (11)	21:54	113	20:46 (9)	
4	08:50		10:18 (18)	08:19		09:00 (19)	07:25			07:14		06:11		07:00 (11)	05:30		06:26 (10)	
	16:47	98	14:42 (17)	17:37	14	09:14 (19)	18:28			20:21		21:11	35	07:35 (11)	21:55	116	20:47 (9)	
5	08:50		10:19 (18)	08:18		08:59 (19)	07:23			07:12		06:10		07:00 (11)	05:29		06:25 (10)	
	16:49	97	14:42 (17)	17:39	16	09:15 (19)	18:30			20:23		21:13	34	07:34 (11)	21:56	119	20:47 (9)	
6	08:50		10:19 (18)	08:16		08:57 (19)	07:20			07:10		06:08		07:01 (11)	05:29		06:25 (10)	
	16:50	97	14:42 (17)	17:41	19	09:16 (19)	18:31			20:24		21:15	32	07:33 (11)	21:57	122	20:49 (9)	
7	08:49		10:20 (18)	08:14		08:55 (19)	07:18			07:08		06:06		07:02 (11)	05:28		06:13 (6)	
	16:51	95	14:42 (17)	17:42	21	09:16 (19)	18:33			20:26		21:16	30	07:32 (11)	21:58	128	20:50 (9)	
8	08:49		10:21 (18)	08:13		08:53 (19)	07:16			07:05		06:04		07:03 (11)	05:28		06:12 (6)	
	16:52	93	14:42 (17)	17:44	23	09:16 (19)	18:35			20:28		21:18	28	07:31 (11)	21:58	131	20:51 (9)	
9	08:48		10:21 (18)	08:11		08:51 (19)	07:14			07:03		06:03		07:04 (11)	05:27		06:12 (6)	
	16:54	93	14:42 (17)	17:46	25	09:16 (19)	18:37			20:29		21:19	26	07:30 (11)	21:59	134	20:52 (9)	
10	08:48		10:22 (18)	08:09		08:49 (19)	07:12			07:01		06:01		07:05 (11)	05:27		06:11 (6)	
	16:55	89	14:41 (17)	17:48	27	09:16 (19)	18:38			20:31	2	07:39 (12)	21:21	23	07:28 (11)	22:00	137	20:52 (9)
11	08:47		10:22 (18)	08:07		08:47 (19)	07:09			06:59		07:35 (12)	05:59		07:07 (11)	05:26		06:11 (6)
	16:56	88	14:41 (17)	17:50	29	09:16 (19)	18:40			20:33	5	07:40 (12)	21:23	20	07:27 (11)	22:01	138	20:53 (9)
12	08:47		10:24 (18)	08:06		08:45 (19)	07:07			06:57		07:32 (12)	05:58		07:09 (11)	05:26		06:11 (6)
	16:58	85	14:41 (17)	17:52	31	09:16 (19)	18:42			20:34	7	07:39 (12)	21:24	15	07:24 (11)	22:02	141	20:54 (9)
13	08:46		10:24 (18)	08:04		08:44 (19)	07:05			06:54		07:30 (12)	05:56		07:12 (11)	05:26		06:11 (6)
	16:59	84	14:41 (17)	17:54	31	09:15 (19)	18:44			20:36	9	07:39 (12)	21:26	9	07:21 (11)	22:02	141	20:54 (9)
14	08:45		10:25 (18)	08:02		08:45 (19)	07:02			06:52		07:28 (11)	05:54			05:26		06:11 (6)
	17:01	80	14:40 (17)	17:55	30	09:15 (19)	18:45			20:38	10	07:38 (12)	21:27			22:03	143	20:55 (9)
15	08:44		10:26 (18)	08:00		08:45 (19)	07:00			06:50		07:26 (11)	05:53			05:25		06:11 (6)
	17:02	78	14:40 (17)	17:57	29	09:14 (19)	18:47			20:40	12	07:38 (12)	21:29			22:03	146	20:56 (9)
16	08:44		10:26 (18)	07:58		08:46 (19)	06:58			06:48		07:24 (11)	05:51			05:25		06:11 (6)
	17:04	74	14:38 (17)	17:59	27	09:13 (19)	18:49			20:41	13	07:37 (12)	21:30			22:04	146	20:56 (9)
17	08:43		10:27 (18)	07:56		08:47 (19)	06:56			06:46		07:22 (11)	05:50			05:25		06:11 (6)
	17:06	70	14:37 (17)	18:01	25	09:12 (19)	18:51			20:43	15	07:37 (12)	21:32			22:04	147	20:57 (9)
18	08:42		10:28 (18)	07:54		08:48 (19)	06:53			06:44		07:20 (11)	05:48			05:25		06:11 (6)
	17:07	65	14:36 (17)	18:03	22	09:10 (19)	18:52			20:45	16	07:36 (11)	21:33			22:05	148	20:57 (9)
19	08:41		10:30 (18)	07:52		08:50 (19)	06:51			06:41		07:18 (11)	05:47			05:25		06:11 (6)
	17:09	58	14:34 (17)	18:05	18	09:08 (19)	18:54			20:46	19	07:37 (11)	21:35			22:05	148	20:57 (9)
20	08:40		10:30 (18)	07:50		08:53 (19)	06:49			06:39		07:16 (11)	05:46			05:25		06:11 (6)
	17:10	47	14:29 (17)	18:06	13	09:06 (19)	18:56			20:48	22	07:38 (11)	21:36			22:05	149	20:57 (9)
21	08:39		10:32 (18)	07:48			06:47			06:37		07:14 (11)	05:44			05:25		06:11 (6)
	17:12	37	11:09 (18)	18:08			18:57			20:50	24	07:38 (11)	21:38			22:06	149	20:57 (9)
22	08:38		10:33 (18)	07:46			06:44			06:35		07:12 (11)	05:43			05:26		06:11 (6)
	17:14	35	11:08 (18)	18:10			18:59			20:51	26	07:38 (11)	21:39			22:06	149	20:57 (9)
23	08:36		10:34 (18)	07:44		08:22 (20)	06:42			06:33		07:10 (11)	05:42			05:26		06:12 (6)
	17:16	33	11:07 (18)	18:12	3	08:25 (20)	19:01			20:53	29	07:39 (11)	21:40			22:06	149	20:58 (9)
24	08:35		10:37 (18)	07:42		08:19 (20)	06:40			06:31		07:08 (11)	05:41		06:46 (10)	05:26		06:12 (6)
	17:17	29	11:06 (18)	18:14	5	08:24 (20)	19:02			20:55	31	07:39 (11)	21:42	14	07:00 (10)	22:06	148	20:58 (9)
25	08:34		10:38 (18)	07:40		08:17 (20)	06:37			06:29		07:06 (11)	05:39		06:41 (10)	05:26		06:12 (6)
	17:19	26	11:04 (18)	18:15	7	08:24 (20)	19:04			20:56	32	07:38 (11)	21:43	43	20:26 (9)	22:06	148	20:58 (9)
26	08:33		10:41 (18)	07:38		08:15 (20)	06:35			06:27		07:04 (11)	05:38		06:38 (10)	05:27		06:13 (6)
	17:21	21	11:02 (18)	18:17	9	08:24 (20)	19:06			20:58	34	07:38 (11)	21:44	58	20:30 (9)	22:06	146	20:58 (9)
27	08:31		10:44 (18)	07:36		08:13 (20)	06:33			06:25		07:02 (11)	05:37		06:36 (10)	05:27		06:13 (6)
	17:22	15	10:59 (18)	18:19	11	08:24 (20)	19:08			21:00	36	07:38 (11)	21:46	68	20:33 (9)	22:06	146	20:58 (9)
28	08:30			07:33		08:10 (20)	06:30			06:23		07:00 (11)	05:36		06:34 (10)	05:28		06:14 (6)
	17:24			18:21	12	08:22 (20)	19:09			21:01	38	07:38 (11)	21:47	78	20:36 (9)	22:06	144	20:58 (9)
29	08:29						07:28			06:21		06:59 (11)	05:35		06:32 (10)	05:28		06:14 (6)
	17:26						20:11			21:03	39	07:38 (11)	21:48	85	20:38 (9)	22:06	143	20:58 (9)
30	08:27						07:26			06:19		06:59 (11)	05:34		06:30 (10)	05:29		06:15 (6)
	17:28						20:13			21:05	38	07:37 (11)	21:49	92	20:39 (9)	22:06	141	20:58 (9)
31	08:26		09:08 (19)				07:24						05:33		06:29 (10)			
	17:30	3	09:11 (19)				20:14						21:50	98	20:41 (9)			
Potential sun hours	260			278			367			416			484			497		
Total, worst case	1889			473			36			457			899			4122		
Sun reduction	0,18			0,27			0,30			0,38			0,43			0,38		
Oper. time red.	0,97			0,97			0,97			0,97			0,97			0,97		
Wind dir. red.	0,65			0,57			0,55			0,62			0,62			0,62		
Total reduction	0,12			0,15			0,16			0,23			0,26			0,23		
Total, real	222			71			6			107			235			961		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (20)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29	06:15 (6)	06:06	07:18 (11)	06:55	07:34 (12)
2	22:05	138	20:57 (9)	21:34	17	07:35 (11)
3	05:31	06:16 (6)	06:07	07:17 (11)	06:56	07:35 (12)
4	22:05	137	20:57 (9)	21:32	21	07:38 (11)
5	05:32	06:17 (6)	06:09	07:15 (11)	06:58	07:38 (12)
6	22:05	134	20:57 (9)	21:31	24	07:39 (11)
7	05:32	06:17 (6)	06:10	07:13 (11)	07:00	07:41 (11)
8	22:04	131	20:56 (9)	21:29	27	07:40 (11)
9	05:32	06:18 (6)	06:12	07:13 (11)	07:01	07:41 (11)
10	22:04	129	20:56 (9)	21:27	28	07:41 (11)
11	05:33	06:31 (10)	06:13	07:11 (11)	07:03	07:42 (11)
12	22:03	125	20:56 (9)	21:26	31	07:42 (11)
13	05:34	06:32 (10)	06:15	07:11 (11)	07:04	07:43 (11)
14	22:03	121	20:55 (9)	21:24	32	07:43 (11)
15	05:35	06:33 (10)	06:16	07:10 (11)	07:06	07:44 (11)
16	22:02	117	20:54 (9)	21:22	34	07:44 (11)
17	05:36	06:33 (10)	06:18	07:09 (11)	07:08	07:45 (11)
18	22:02	115	20:53 (9)	21:20	36	07:45 (11)
19	05:37	06:34 (10)	06:19	07:08 (11)	07:09	07:45 (11)
20	22:01	110	20:52 (9)	21:18	37	07:45 (11)
21	05:38	06:35 (10)	06:21	07:07 (11)	07:11	07:45 (11)
22	22:00	106	20:51 (9)	21:16	38	07:45 (11)
23	05:39	06:37 (10)	06:23	07:07 (11)	07:12	07:45 (11)
24	21:59	100	20:50 (9)	21:14	38	07:45 (11)
25	05:40	06:38 (10)	06:24	07:06 (11)	07:14	07:45 (11)
26	21:58	95	20:48 (9)	21:13	39	07:45 (11)
27	05:41	06:40 (10)	06:26	07:07 (11)	07:16	07:45 (11)
28	21:57	88	20:47 (9)	21:11	39	07:46 (11)
29	05:42	06:41 (10)	06:27	07:08 (11)	07:17	07:46 (11)
30	21:56	82	20:45 (9)	21:09	37	07:45 (11)
31	05:44	06:43 (10)	06:29	07:10 (11)	07:19	07:45 (11)
32	21:55	74	20:43 (9)	21:07	36	07:46 (11)
33	05:45	06:45 (10)	06:31	07:11 (11)	07:20	07:46 (11)
34	21:54	64	20:40 (9)	21:05	34	07:45 (11)
35	05:46	06:49 (10)	06:32	07:13 (11)	07:22	07:45 (11)
36	21:53	51	20:38 (9)	21:03	32	07:45 (11)
37	05:47	06:53 (10)	06:34	07:14 (11)	07:24	07:45 (11)
38	21:52	32	20:32 (9)	21:01	30	07:44 (11)
39	05:49	06:59 (10)	06:35	07:16 (11)	07:25	07:44 (11)
40	21:51	7	07:06 (10)	20:58	28	07:44 (11)
41	05:50		06:37	07:17 (11)	07:27	07:44 (11)
42	21:50		20:56	07:43 (11)	19:47	07:43 (11)
43	05:51		06:39	07:19 (11)	07:28	07:43 (11)
44	21:49		20:54	07:43 (11)	19:44	07:43 (11)
45	05:53		06:40	07:20 (11)	07:30	07:43 (11)
46	21:47		20:52	07:41 (11)	19:42	07:43 (11)
47	05:54		06:42	07:22 (11)	07:32	07:43 (11)
48	21:46		20:50	07:41 (11)	19:40	07:43 (11)
49	05:55		06:43	07:23 (11)	07:33	07:43 (11)
50	21:45		20:48	07:39 (11)	19:37	07:43 (11)
51	05:57		06:45	07:25 (11)	07:35	07:43 (11)
52	21:43		20:46	07:40 (12)	19:35	07:43 (11)
53	05:58		06:47	07:26 (11)	07:37	07:43 (11)
54	21:42		20:44	07:39 (12)	19:33	07:43 (11)
55	06:00		06:48	07:28 (11)	07:38	07:43 (11)
56	21:40		20:41	07:40 (12)	19:31	07:43 (11)
57	06:01		06:50	07:29 (11)	07:40	07:43 (11)
58	21:39		20:39	07:39 (12)	19:28	07:43 (11)
59	06:03		06:51	07:31 (12)	07:41	07:43 (11)
60	21:37		20:37	07:40 (12)	19:26	07:43 (11)
61	06:04		07:21 (11)	06:53	07:32 (12)	07:43 (11)
62	21:36	12	07:33 (11)	20:35	7	07:39 (12)
Potential sun hours	501		453		381	332
Total, worst case	1968		810		6	352
Sun reduction	0,40		0,42		0,36	0,31
Oper. time red.	0,97		0,97		0,97	0,97
Wind dir. red.	0,62		0,62		0,62	0,56
Total reduction	0,24		0,26		0,22	0,17
Total, real	477		208		1	59
						267
						1008
						0,22
						0,97
						0,63
						0,14
						0,11
						326

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (21)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	08:08 (25) 20:16	07:57 (20) 20:17	15:55 (17) 21:52
2	08:50 16:45	08:23 17:33	07:29 18:24	08:06 (25) 20:18	07:59 (20) 21:08	15:57 (17) 21:53
3	08:50 16:46	08:21 17:35	07:27 18:26	08:04 (25) 20:19	08:03 (19) 21:10	16:00 (17) 21:54
4	08:50 16:47	08:19 17:37	07:25 18:28	08:01 (25) 20:21	08:04 (19) 21:11	16:01 (17) 21:55
5	08:50 16:49	08:18 17:39	08:59 (26) 18:30	14:29 (17) 20:23	08:05 (19) 21:13	16:03 (17) 21:56
6	08:50 16:50	08:16 17:41	08:57 (26) 18:31	08:04 (18) 20:24	08:07 (19) 21:14	16:06 (17) 21:57
7	08:49 16:51	08:14 17:42	08:55 (26) 18:33	07:58 (18) 20:26	08:11 (19) 21:16	16:08 (17) 21:58
8	08:49 16:52	08:13 17:44	08:53 (26) 18:35	07:55 (18) 20:28	08:28 (18) 21:18	16:10 (17) 21:58
9	08:48 16:54	08:11 17:46	15:13 (17) 18:37	07:52 (18) 20:29	08:28 (18) 21:19	16:13 (17) 21:59
10	08:48 16:55	08:09 17:48	15:09 (17) 18:38	07:50 (18) 20:31	08:29 (18) 21:21	16:15 (17) 22:00
11	08:47 16:56	08:07 17:50	15:07 (17) 18:40	07:47 (18) 20:33	08:29 (18) 21:23	16:18 (17) 22:01
12	08:47 16:58	08:06 17:52	15:04 (17) 18:42	07:45 (18) 20:34	08:29 (18) 21:24	16:20 (17) 22:02
13	08:46 16:59	08:04 17:54	15:02 (17) 18:44	07:44 (18) 20:36	08:30 (18) 21:26	16:22 (17) 22:03
14	08:45 17:01	08:02 17:55	14:59 (17) 18:45	07:42 (18) 20:38	08:31 (18) 21:27	16:24 (17) 22:04
15	08:44 17:02	08:00 17:57	14:57 (17) 18:47	07:40 (18) 20:40	08:32 (18) 21:29	16:26 (17) 22:05
16	08:44 17:04	07:58 17:59	14:55 (17) 18:49	07:39 (18) 20:41	08:33 (18) 21:30	16:28 (17) 22:06
17	08:43 17:06	07:56 18:01	14:53 (17) 18:51	07:37 (18) 20:43	08:34 (18) 21:32	16:30 (17) 22:07
18	08:42 17:07	07:54 18:03	14:51 (17) 18:52	07:29 (19) 20:45	08:35 (18) 21:33	16:32 (17) 22:08
19	08:41 17:09	07:52 18:05	14:49 (17) 18:54	07:27 (19) 20:46	08:36 (18) 21:35	16:34 (17) 22:09
20	08:40 17:10	07:50 18:06	14:47 (17) 18:56	07:24 (19) 20:48	08:38 (18) 21:36	16:36 (17) 22:10
21	08:39 17:12	07:48 18:08	14:46 (17) 18:57	07:22 (19) 20:50	08:40 (18) 21:38	16:38 (17) 22:11
22	08:38 17:14	07:46 18:10	14:44 (17) 18:59	07:20 (19) 20:51	08:42 (18) 21:39	16:40 (17) 22:12
23	08:36 17:16	07:44 18:12	14:43 (17) 19:01	07:17 (19) 20:53	08:46 (18) 21:40	16:42 (17) 22:13
24	08:35 17:17	07:42 18:14	14:41 (17) 19:02	07:15 (19) 20:55	08:51 (18) 21:42	16:44 (17) 22:14
25	08:34 17:19	07:40 18:15	14:39 (17) 19:04	07:13 (19) 20:56	15:43 (17) 21:43	16:46 (17) 22:15
26	08:33 17:21	07:38 18:17	08:15 (25) 19:06	07:10 (19) 20:58	15:45 (17) 21:44	16:48 (17) 22:16
27	08:31 17:22	07:36 18:19	08:13 (25) 19:08	07:08 (19) 21:00	15:46 (17) 21:46	16:50 (17) 22:17
28	08:30 17:24	07:33 18:21	08:10 (25) 19:09	07:06 (19) 21:01	15:48 (17) 21:47	16:52 (17) 22:18
29	08:29 17:26		07:28 20:11	08:04 (19) 21:03	15:51 (17) 21:48	16:54 (17) 22:19
30	08:27 17:28		07:26 20:13	08:01 (19) 21:05	15:53 (17) 21:49	16:56 (17) 22:20
31	08:26 17:30		07:24 20:14	07:59 (20) 21:07	15:55 (17) 21:50	16:58 (17) 22:21
Potential sun hours	260	278	367	415	484	497
Total, worst case		2069	6423	5363	1157	
Sun reduction		0,27	0,30	0,38	0,43	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,69	0,65	0,66	0,69	
Total reduction		0,18	0,19	0,25	0,29	
Total, real		376	1233	1315	334	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (21)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:30	06:06	16:29 (17)	06:55	08:28 (18)	07:43
	22:05	21:34	17:22 (17)	20:33	17:41 (17)	19:24
2	05:30	06:07	16:27 (17)	06:56	08:27 (18)	07:45
	22:05	21:32	17:24 (17)	20:30	17:40 (17)	19:21
3	05:31	06:09	16:24 (17)	06:58	08:26 (18)	07:46
	22:05	21:31	17:25 (17)	20:28	17:41 (17)	19:19
4	05:32	06:10	16:21 (17)	07:00	08:25 (18)	07:48
	22:04	21:29	17:26 (17)	20:26	17:40 (17)	19:17
5	05:32	06:12	16:19 (17)	07:01	08:08 (19)	07:50
	22:04	21:27	17:28 (17)	20:24	17:41 (17)	19:15
6	05:33	06:13	16:17 (17)	07:03	08:03 (19)	07:51
	22:03	21:26	17:29 (17)	20:21	17:40 (17)	19:12
7	05:34	06:15	16:15 (17)	07:04	08:01 (19)	07:53
	22:03	21:24	17:30 (17)	20:19	17:40 (17)	19:10
8	05:35	06:16	16:12 (17)	07:06	07:58 (19)	07:55
	22:02	21:22	17:31 (17)	20:17	17:39 (17)	19:08
9	05:36	06:18	16:10 (17)	07:08	07:57 (19)	07:56
	22:01	21:20	17:32 (17)	20:14	17:40 (17)	19:06
10	05:37	06:19	16:07 (17)	07:09	07:53 (20)	07:58
	22:01	21:18	17:33 (17)	20:12	17:39 (17)	19:03
11	05:38	06:21	16:05 (17)	07:11	07:50 (20)	08:00
	22:00	21:16	17:33 (17)	20:10	17:39 (17)	19:01
12	05:39	06:23	16:03 (17)	07:12	07:51 (20)	08:01
	21:59	21:14	17:34 (17)	20:08	17:39 (17)	18:59
13	05:40	06:24	16:00 (17)	07:14	07:52 (19)	08:03
	21:58	21:13	17:34 (17)	20:05	17:38 (17)	18:57
14	05:41	06:26	15:58 (17)	07:16	07:54 (19)	08:05
	21:57	21:11	17:36 (17)	20:03	17:38 (17)	18:55
15	05:42	06:27	15:55 (17)	07:17	07:55 (19)	08:07
	21:56	21:09	17:36 (17)	20:01	17:37 (17)	18:52
16	05:44	06:29	15:54 (17)	07:19	07:57 (19)	08:08
	21:55	21:07	17:37 (17)	19:58	17:37 (17)	18:50
17	05:45	06:31	15:51 (17)	07:20	07:58 (19)	08:10
	21:54	21:05	17:37 (17)	19:56	17:36 (17)	18:48
18	05:46	06:32	15:49 (17)	07:22	08:00 (19)	08:12
	21:53	21:03	17:38 (17)	19:54	17:36 (17)	18:46
19	05:47	06:34	08:55 (18)	07:24	08:02 (19)	08:13
	21:52	21:01	17:38 (17)	19:51	17:36 (17)	18:44
20	05:49	06:35	08:51 (18)	07:25	08:03 (19)	08:15
	21:51	20:58	17:39 (17)	19:49	17:35 (17)	18:42
21	05:50	06:37	08:47 (18)	07:27	08:05 (19)	08:17
	21:50	20:56	17:39 (17)	19:47	17:35 (17)	18:40
22	05:51	06:39	08:44 (18)	07:28	08:06 (19)	08:19
	21:49	20:54	17:40 (17)	19:44	17:33 (17)	18:38
23	05:53	06:40	08:42 (18)	07:30	08:08 (19)	08:20
	21:47	20:52	17:39 (17)	19:42	17:33 (17)	18:36
24	05:54	06:42	08:40 (18)	07:32	08:10 (19)	08:22
	21:46	20:50	17:40 (17)	19:40	17:33 (17)	18:34
25	05:55	06:43	08:38 (18)	07:33	08:11 (19)	08:24
	21:45	20:48	17:40 (17)	19:37	17:32 (17)	18:32
26	05:57	06:45	08:36 (18)	07:35	08:20 (18)	08:26
	21:43	20:46	17:41 (17)	19:35	17:31 (17)	18:30
27	05:58	06:47	08:34 (18)	07:37	08:20 (18)	08:27
	21:42	20:44	17:40 (17)	19:33	17:30 (17)	18:28
28	06:00	06:48	08:33 (18)	07:38	08:21 (18)	08:29
	21:40	20:41	17:41 (17)	19:31	17:29 (17)	18:26
29	06:01	06:50	08:31 (18)	07:40	08:22 (18)	08:31
	21:39	20:39	17:40 (17)	19:28	17:29 (17)	18:24
30	06:03	06:52	08:31 (18)	07:41	08:22 (18)	08:33
	21:37	20:37	17:41 (17)	19:26	17:27 (17)	18:22
31	06:04	06:53	08:29 (18)	07:42	07:35	14:37 (17)
	21:36	20:35	17:40 (17)	19:25	17:20	14:33 (17)
Potential sun hours	501	453	381	332	267	245
Total, worst case	318	3708	7023	3932	235	
Sun reduction	0,40	0,42	0,36	0,31	0,22	
Oper. time red.	0,97	0,97	0,97	0,97	0,97	
Wind dir. red.	0,69	0,67	0,65	0,68	0,69	
Total reduction	0,27	0,28	0,23	0,20	0,15	
Total, real	84	1024	1587	797	35	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:50		09:40 (24)	08:24	09:38 (24)	07:31	07:21		19:37 (12)	06:17	06:55 (16)	05:32
	16:44	88	15:51 (22)	17:31	16:17 (22)	18:22	20:16	2	19:38 (12)	21:06	20:21 (14)	21:51
2	08:50		09:40 (24)	08:23	09:39 (24)	07:29	07:19		19:36 (12)	06:15	06:53 (16)	05:31
	16:45	87	15:52 (22)	17:33	16:15 (22)	18:24	20:18	3	19:39 (12)	21:08	20:20 (14)	21:53
3	08:50		09:39 (24)	08:21	09:40 (24)	07:27	07:17		19:36 (12)	06:13	06:51 (16)	05:31
	16:46	90	15:53 (22)	17:35	16:14 (22)	18:26	20:19	5	19:41 (12)	21:09	20:20 (14)	21:54
4	08:50		09:39 (24)	08:19	09:41 (24)	07:25	07:14		19:37 (12)	06:11	06:50 (16)	05:30
	16:47	91	15:55 (22)	17:37	16:12 (22)	18:28	20:21	5	19:42 (12)	21:11	20:21 (14)	21:55
5	08:50		09:39 (24)	08:18	09:42 (24)	07:22	07:12		19:36 (13)	06:10	06:48 (16)	05:29
	16:48	91	15:56 (22)	17:39	16:10 (22)	18:30	20:23	8	19:44 (12)	21:13	20:30 (6)	21:56
6	08:49		09:38 (24)	08:16	09:45 (24)	07:20	07:10		19:34 (13)	06:08	06:46 (16)	05:29
	16:50	93	15:57 (22)	17:40	16:07 (22)	18:31	20:24	11	19:45 (12)	21:14	20:31 (6)	21:57
7	08:49		09:37 (24)	08:14	09:47 (24)	07:18	07:08		19:34 (13)	06:06	06:45 (16)	05:28
	16:51	94	15:58 (22)	17:42	16:59 (21)	18:33	20:26	13	19:47 (12)	21:16	20:33 (6)	21:57
8	08:49		09:37 (24)	08:13	09:51 (24)	07:16	07:05		19:33 (13)	06:04	06:43 (16)	05:28
	16:52	95	16:01 (22)	17:44	17:01 (21)	18:35	20:28	16	19:49 (13)	21:18	20:34 (6)	21:58
9	08:48		09:36 (24)	08:11	16:56 (21)	07:14	07:03		19:33 (13)	06:02	06:42 (16)	05:27
	16:54	95	16:02 (22)	17:46	17:03 (21)	18:37	20:29	18	19:51 (13)	21:19	20:19 (14)	21:59
10	08:48		09:35 (24)	08:09	16:56 (21)	07:11	07:01		19:33 (13)	06:01	06:40 (16)	05:27
	16:55	95	16:03 (22)	17:48	17:05 (21)	18:38	20:31	19	19:52 (13)	21:21	20:19 (14)	22:00
11	08:47		09:34 (24)	08:07	16:56 (21)	07:09	06:59		19:32 (13)	05:59	06:39 (16)	05:26
	16:56	96	16:05 (22)	17:50	17:07 (21)	18:40	20:33	21	19:53 (13)	21:22	20:19 (14)	22:01
12	08:46		09:33 (24)	08:05	16:56 (21)	07:07	06:56		19:33 (13)	05:57	06:37 (16)	05:26
	16:58	96	16:06 (22)	17:52	17:09 (21)	18:42	20:34	22	19:55 (13)	21:24	20:18 (14)	22:01
13	08:46		09:32 (24)	08:04	16:56 (21)	07:05	06:54		19:33 (13)	05:56	06:36 (16)	05:26
	16:59	94	16:08 (22)	17:53	17:11 (21)	18:44	20:36	23	19:56 (13)	21:26	20:18 (14)	22:02
14	08:45		09:31 (24)	08:02	16:56 (21)	07:02	06:52		19:34 (13)	05:54	06:34 (16)	05:25
	17:01	93	16:10 (22)	17:55	17:13 (21)	18:45	20:38	24	19:58 (13)	21:27	20:17 (14)	22:03
15	08:44		09:30 (24)	08:00	16:57 (21)	07:00	06:50		19:34 (13)	05:53	06:34 (16)	05:25
	17:02	86	16:12 (22)	17:57	17:15 (21)	18:47	20:39	26	20:00 (14)	21:29	20:17 (14)	22:03
16	08:43		09:30 (24)	07:58	16:58 (21)	06:58	06:48		19:36 (13)	05:51	06:34 (16)	05:25
	17:04	83	16:14 (22)	17:59	17:18 (21)	18:49	20:41	25	20:01 (14)	21:30	20:16 (14)	22:04
17	08:43		09:30 (24)	07:56	16:58 (21)	06:56	06:46		19:37 (13)	05:50	06:33 (16)	05:25
	17:05	86	16:16 (22)	18:01	17:19 (21)	18:50	20:43	26	20:03 (14)	21:32	20:15 (14)	22:04
18	08:42		09:30 (24)	07:54	16:59 (21)	06:53	06:43		19:37 (14)	05:48	06:33 (16)	05:25
	17:07	87	16:18 (22)	18:03	17:17 (21)	18:52	20:44	28	20:05 (14)	21:33	20:15 (14)	22:05
19	08:41		09:31 (24)	07:52	17:01 (21)	06:51	06:41		19:35 (14)	05:47	06:33 (16)	05:25
	17:09	88	16:19 (22)	18:04	17:16 (21)	18:54	20:46	31	20:06 (14)	21:35	20:14 (14)	22:05
20	08:40		09:31 (24)	07:50	17:04 (21)	06:49	06:39		19:34 (14)	05:46	06:33 (16)	05:25
	17:10	86	16:18 (22)	18:06	17:13 (21)	18:56	20:48	34	20:08 (14)	21:36	20:14 (14)	22:05
21	08:39		09:31 (24)	07:48		06:46	06:37		19:33 (14)	05:44	06:33 (16)	05:25
	17:12	87	16:19 (22)	18:08		18:57	20:50	36	20:09 (14)	21:37	20:13 (14)	22:06
22	08:37		09:32 (24)	07:46	17:29 (20)	06:44	06:35		19:31 (14)	05:43	06:32 (16)	05:25
	17:14	87	16:20 (22)	18:10	17:30 (20)	18:59	20:51	40	20:11 (14)	21:39	20:12 (14)	22:06
23	08:36		09:32 (24)	07:44	17:29 (20)	06:42	06:33		19:30 (14)	05:42	06:32 (16)	05:26
	17:15	86	16:19 (22)	18:12	17:31 (20)	19:01	20:53	42	20:12 (14)	21:40	20:11 (14)	22:06
24	08:35		09:33 (24)	07:42	17:29 (20)	06:40	06:31		19:29 (14)	05:40	06:32 (16)	05:26
	17:17	86	16:20 (22)	18:13	17:33 (20)	19:02	20:55	45	20:14 (14)	21:42	20:10 (14)	22:06
25	08:34		09:33 (24)	07:40	17:30 (20)	06:37	06:29		19:28 (14)	05:39	06:31 (16)	05:26
	17:19	83	16:19 (22)	18:15	17:35 (20)	19:04	20:56	47	20:15 (14)	21:43	20:10 (14)	22:06
26	08:33		09:34 (24)	07:38	17:32 (20)	06:35	06:27		19:28 (14)	05:38	06:31 (16)	05:27
	17:21	83	16:20 (22)	18:17	17:37 (20)	19:06	20:58	49	20:17 (14)	21:44	20:09 (14)	22:06
27	08:31		09:34 (24)	07:35	17:35 (20)	06:33	06:25		19:27 (14)	05:37	06:32 (16)	05:27
	17:22	81	16:19 (22)	18:19	17:39 (20)	19:07	21:00	51	20:18 (14)	21:45	20:09 (14)	22:06
28	08:30		09:34 (24)	07:33		06:30	06:23		19:26 (14)	05:36	06:32 (16)	05:28
	17:24	80	16:18 (22)	18:21		19:09	21:01	54	20:20 (14)	21:47	20:07 (14)	22:06
29	08:28		09:35 (24)			07:28	06:21		06:58 (16)	05:35	06:32 (16)	05:28
	17:26	78	16:19 (22)			20:11	21:03	69	20:20 (14)	21:48	20:06 (14)	22:06
30	08:27		09:36 (24)			07:26	06:19		06:57 (16)	05:34	06:32 (16)	05:29
	17:28	75	16:18 (22)			20:12	21:05	76	20:21 (14)	21:49	20:05 (14)	22:06
31	08:26		09:36 (24)			07:23				05:33	06:32 (16)	
	17:30	72	16:17 (22)			20:14				21:50	20:03 (14)	
Potential sun hours	260		278		367	416		484		497		
Total, worst case	2712		557			869		3091		1994		
Sun reduction	0,18		0,27			0,38		0,43		0,38		
Oper. time red.	0,97		0,97			0,97		0,97		0,97		
Wind dir. red.	0,64		0,64			0,57		0,61		0,65		
Total reduction	0,12		0,17			0,21		0,26		0,24		
Total, real	313		94			187		793		486		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

Printed/Page

17-03-2014 15:05 / 6

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

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Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October			November			December		
1	05:29	06:38 (16)	06:05	06:48 (16)	06:55	19:32 (13)	07:43	07:36	16:25 (21)	08:27	09:16 (24)							
	22:05	66 07:44 (16)	21:34	106 20:28 (14)	20:32	21 19:53 (13)	19:24	17:18	9 16:34 (21)	16:38	95 15:47 (22)							
2	05:30	06:39 (16)	06:07	06:50 (16)	06:56	19:31 (13)	07:45	07:38	16:26 (21)	08:28	09:18 (24)							
	22:05	66 07:45 (16)	21:32	105 20:29 (14)	20:30	19 19:50 (13)	19:21	17:16	6 16:32 (21)	16:38	95 15:46 (22)							
3	05:31	06:38 (16)	06:08	06:51 (16)	06:58	19:31 (13)	07:46	07:40	09:20 (24)	08:29	09:19 (24)							
	22:05	66 07:44 (16)	21:31	104 20:29 (14)	20:28	18 19:49 (13)	19:19	17:14	18 16:30 (21)	16:37	94 15:45 (22)							
4	05:31	06:39 (16)	06:10	06:52 (16)	06:59	19:30 (13)	07:48	07:42	09:17 (24)	08:31	09:21 (24)							
	22:04	66 07:45 (16)	21:29	105 20:45 (6)	20:26	16 19:46 (13)	19:17	17:13	22 16:28 (21)	16:36	95 15:45 (22)							
5	05:32	06:39 (16)	06:12	06:54 (16)	07:01	19:31 (13)	07:50	07:43	09:15 (24)	08:32	09:22 (24)							
	22:04	66 07:45 (16)	21:27	102 20:44 (6)	20:23	13 19:44 (12)	19:14	17:11	35 15:37 (22)	16:36	95 15:44 (22)							
6	05:33	06:40 (16)	06:13	06:55 (16)	07:03	19:30 (13)	07:51	07:45	09:13 (24)	08:33	09:24 (24)							
	22:03	66 07:46 (16)	21:25	100 20:42 (6)	20:21	11 19:41 (12)	19:12	17:09	45 15:41 (22)	16:35	93 15:44 (22)							
7	05:34	06:40 (16)	06:15	06:57 (16)	07:04	19:31 (13)	07:53	07:47	09:12 (24)	08:35	09:25 (24)							
	22:03	66 07:46 (16)	21:24	98 20:41 (6)	20:19	9 19:40 (12)	19:10	17:07	53 15:43 (22)	16:35	91 15:43 (22)							
8	05:35	06:39 (16)	06:16	06:58 (16)	07:06	19:31 (12)	07:55	07:49	09:10 (24)	08:36	09:27 (24)							
	22:02	67 07:46 (16)	21:22	93 20:30 (14)	20:17	6 19:37 (12)	19:08	17:06	59 15:45 (22)	16:35	91 15:43 (22)							
9	05:36	06:40 (16)	06:18	06:59 (16)	07:07	19:30 (12)	07:56	07:50	09:10 (24)	08:37	09:28 (24)							
	22:01	66 07:46 (16)	21:20	90 20:29 (14)	20:14	5 19:35 (12)	19:05	17:04	63 15:46 (22)	16:34	90 15:42 (22)							
10	05:37	06:40 (16)	06:19	07:01 (16)	07:09	19:29 (12)	07:58	07:52	09:09 (24)	08:38	09:29 (24)							
	22:01	72 20:05 (14)	21:18	87 20:29 (14)	20:12	3 19:32 (12)	19:03	17:03	68 15:48 (22)	16:34	87 15:41 (22)							
11	05:38	06:40 (16)	06:21	07:02 (16)	07:11	19:29 (12)	08:00	07:54	09:08 (24)	08:39	09:30 (24)							
	22:00	78 20:08 (14)	21:16	83 20:29 (14)	20:10	2 19:30 (12)	19:01	17:01	72 15:49 (22)	16:34	87 15:41 (22)							
12	05:39	06:40 (16)	06:23	07:04 (16)	07:12	08:01	18:59	07:56	09:08 (24)	08:40	09:31 (24)							
	21:59	84 20:11 (14)	21:14	79 20:29 (14)	20:07	18:59	18:57	16:59	75 15:50 (22)	16:34	86 15:41 (22)							
13	05:40	06:40 (16)	06:24	07:05 (16)	07:14	08:03	18:57	07:57	09:07 (24)	08:41	09:32 (24)							
	21:58	86 20:12 (14)	21:12	74 20:28 (14)	20:05	18:57	18:55	16:58	77 15:50 (22)	16:34	84 15:40 (22)							
14	05:41	06:41 (16)	06:26	07:07 (16)	07:15	08:05	18:59	07:59	09:07 (24)	08:42	09:33 (24)							
	21:57	89 20:14 (14)	21:10	68 20:28 (14)	20:03	18:54	18:52	16:57	80 15:51 (22)	16:34	83 15:40 (22)							
15	05:42	06:41 (16)	06:27	19:34 (14)	07:17	08:06	18:06 (20)	08:01	09:07 (24)	08:43	09:34 (24)							
	21:56	91 20:15 (14)	21:08	53 20:27 (14)	20:01	18:52	5 18:11 (20)	16:55	81 15:52 (22)	16:34	83 15:40 (22)							
16	05:43	06:41 (16)	06:29	19:35 (14)	07:19	08:08	18:04 (20)	08:03	09:07 (24)	08:44	09:35 (24)							
	21:55	94 20:17 (14)	21:07	50 20:25 (14)	19:58	18:50	5 18:09 (20)	16:54	83 15:53 (22)	16:34	83 15:40 (22)							
17	05:45	06:41 (16)	06:30	19:34 (14)	07:20	08:10	18:01 (20)	08:04	09:07 (24)	08:45	09:36 (24)							
	21:54	96 20:18 (14)	21:04	49 20:23 (14)	19:56	18:48	5 18:06 (20)	16:52	84 15:53 (22)	16:34	82 15:41 (22)							
18	05:46	06:41 (16)	06:32	19:35 (14)	07:22	08:12	18:00 (20)	08:06	09:07 (24)	08:46	09:37 (24)							
	21:53	99 20:19 (14)	21:02	47 20:22 (14)	19:54	18:46	3 18:03 (20)	16:51	86 15:54 (22)	16:35	81 15:41 (22)							
19	05:47	06:42 (16)	06:34	19:35 (14)	07:23	08:13	18:00 (20)	08:08	09:07 (24)	08:46	09:38 (24)							
	21:52	101 20:21 (14)	21:00	44 20:19 (14)	19:51	18:44	2 18:01 (20)	16:50	86 15:54 (22)	16:35	81 15:42 (22)							
20	05:48	06:42 (16)	06:35	19:35 (14)	07:25	08:15	18:09	08:09	09:07 (24)	08:47	09:38 (24)							
	21:51	102 20:21 (14)	20:58	42 20:17 (14)	19:49	18:42	16:49	15:55 (22)	87 15:55 (22)	16:35	80 15:41 (22)							
21	05:50	06:42 (16)	06:37	19:36 (14)	07:27	08:17	16:47	08:11	87 15:54 (22)	16:36	80 15:42 (22)							
	21:50	103 20:22 (14)	20:56	39 20:15 (14)	19:47	18:40	17:34 (21)	16:47	87 15:54 (22)	16:36	80 15:42 (22)							
22	05:51	06:42 (16)	06:38	19:36 (14)	07:28	08:19	17:31 (21)	16:46	86 15:54 (22)	16:36	80 15:42 (22)							
	21:48	105 20:23 (14)	20:54	37 20:13 (14)	19:44	18:38	10 17:44 (21)	16:46	86 15:54 (22)	16:36	80 15:42 (22)							
23	05:52	06:42 (16)	06:40	19:38 (14)	07:30	08:20	17:31 (21)	16:44	86 15:54 (22)	16:36	80 15:42 (22)							
	21:47	106 20:23 (14)	20:52	33 20:11 (14)	19:42	18:35	16 17:47 (21)	16:45	88 15:55 (22)	16:37	80 15:43 (22)							
24	05:54	06:43 (16)	06:42	19:38 (14)	07:32	08:22	17:29 (21)	16:46	88 15:55 (22)	16:37	80 15:43 (22)							
	21:46	107 20:25 (14)	20:50	31 20:09 (14)	19:40	18:33	19 17:48 (21)	16:44	87 15:55 (22)	16:37	81 15:44 (22)							
25	05:55	06:43 (16)	06:43	19:40 (14)	07:33	07:24	16:28 (21)	16:48	86 15:54 (22)	16:38	81 15:44 (22)							
	21:44	108 20:25 (14)	20:48	27 20:07 (14)	19:37	17:31	21 16:49 (21)	16:43	86 15:54 (22)	16:38	81 15:44 (22)							
26	05:57	06:43 (16)	06:45	19:39 (13)	07:35	07:26	16:27 (21)	16:49	83 15:53 (22)	16:38	81 15:44 (22)							
	21:43	109 20:26 (14)	20:46	26 20:05 (14)	19:35	17:29	20 16:47 (21)	16:42	83 15:53 (22)	16:38	81 15:44 (22)							
27	05:58	06:44 (16)	06:47	19:37 (13)	07:36	07:27	16:26 (21)	16:49	84 15:52 (22)	16:39	83 15:46 (22)							
	21:42	109 20:26 (14)	20:43	26 20:03 (14)	19:33	17:27	18 16:44 (21)	16:41	84 15:52 (22)	16:39	83 15:46 (22)							
28	06:00	06:45 (16)	06:48	19:35 (13)	07:38	07:29	16:26 (21)	16:42	93 15:50 (22)	16:40	83 15:47 (22)							
	21:40	109 20:27 (14)	20:41	26 20:01 (14)	19:30	17:26	16 16:42 (21)	16:40	93 15:50 (22)	16:40	83 15:47 (22)							
29	06:01	06:45 (16)	06:50	19:34 (13)	07:40	07:31	16:26 (21)	16:42	93 15:50 (22)	16:40	83 15:47 (22)							
	21:39	109 20:27 (14)	20:39	25 19:59 (13)	19:28	17:24	14 16:40 (21)	16:40	94 15:49 (22)	16:41	84 15:48 (22)							
30	06:02	06:45 (16)	06:51	19:33 (13)	07:41	07:33	16:25 (21)	16:42	94 15:49 (22)	16:41	84 15:48 (22)							
	21:37	108 20:27 (14)	20:37	23 19:56 (13)	19:26	17:22	13 16:38 (21)	16:39	96 15:48 (22)	16:42	85 15:49 (22)							
31	06:04	06:47 (16)	06:53	19:32 (13)	07:42	07:34	16:25 (21)	16:43	96 15:48 (22)	16:42	85 15:49 (22)							
	21:36	107 20:28 (14)	20:35	23 19:55 (13)	07:43	17:20	11 16:36 (21)	16:43	96 15:48 (22)	16:42	85 15:49 (22)							
Potential sun hours	501		453		381		332		267		245							
Total, worst case	2767		1895		123		178		2073		2660							
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16							
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97							
Wind dir. red.	0,63		0,59		0,59		0,68		0,63		0,66							
Total reduction	0,24		0,24		0,21		0,20		0,14		0,10							
Total, real	674		460		26		36		281		279							

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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Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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17-03-2014 15:05 / 7

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:50	08:24	07:31	14:43 (23)	07:21	08:31 (24) 06:17
	16:44	17:31	18:22	124 16:47 (23)	20:16	241 18:59 (22) 21:06
2	08:50	08:23	07:29	14:42 (23)	07:19	16:13 (23) 05:31
	16:45	17:33	18:24	126 16:48 (23)	20:18	231 18:54 (22) 21:08
3	08:50	08:21	07:27	14:41 (23)	07:17	16:15 (23) 05:31
	16:46	17:35	18:26	128 16:49 (23)	20:19	217 17:49 (23) 21:09
4	08:50	08:19	16:51 (28) 07:25	08:15 (24) 07:14	16:18 (23) 05:30	
	16:47	17:37	2 16:52 (28) 18:28	135 16:49 (23) 20:21	215 17:48 (23) 21:11	62 17:20 (23) 21:55
5	08:50	08:18	16:50 (28) 07:22	08:06 (24) 07:12	16:20 (23) 05:29	
	16:48	17:39	4 16:54 (28) 18:30	156 17:51 (22) 20:23	213 17:48 (23) 21:13	58 17:18 (23) 21:56
6	08:49	08:16	15:34 (23) 07:20	08:02 (24) 07:10	16:23 (23) 05:29	
	16:50	17:41	33 16:57 (28) 18:31	171 17:53 (22) 20:24	211 17:47 (23) 21:14	53 17:16 (23) 21:57
7	08:49	08:14	15:29 (23) 07:18	07:58 (24) 07:08	16:26 (23) 05:28	
	16:51	17:42	45 16:59 (28) 18:33	185 17:54 (22) 20:26	208 17:46 (23) 21:16	49 17:15 (23) 21:57
8	08:49	08:13	15:24 (23) 07:16	07:55 (24) 07:05	16:29 (23) 05:28	
	16:52	17:44	57 17:01 (28) 18:35	195 17:56 (22) 20:28	205 17:46 (23) 21:18	43 17:12 (23) 21:58
9	08:48	08:11	15:21 (23) 07:14	07:53 (24) 07:03	16:33 (23) 05:27	
	16:54	17:46	65 17:03 (28) 18:37	205 17:58 (22) 20:29	201 17:45 (23) 21:19	39 20:36 (13) 21:59
10	08:48	08:09	15:18 (23) 07:11	07:50 (24) 07:01	16:36 (23) 05:27	
	16:55	17:48	73 17:05 (28) 18:38	213 17:59 (22) 20:31	198 17:45 (23) 21:21	34 20:37 (13) 22:00
11	08:47	08:07	15:15 (23) 07:09	07:48 (24) 06:59	16:41 (23) 05:26	
	16:56	17:50	80 17:07 (28) 18:40	222 18:01 (22) 20:33	195 17:43 (23) 21:22	28 20:39 (13) 22:01
12	08:46	08:05	15:12 (23) 07:07	07:47 (24) 06:56	16:47 (23) 05:26	
	16:58	17:52	88 17:09 (28) 18:42	228 18:03 (22) 20:34	192 17:43 (23) 21:24	17 20:40 (13) 22:01
13	08:46	08:04	15:10 (23) 07:05	07:45 (24) 06:54	20:34 (13) 05:26	
	16:59	17:53	93 17:11 (28) 18:44	235 18:05 (21) 20:36	186 17:42 (23) 21:26	8 20:42 (13) 22:02
14	08:45	08:02	15:08 (23) 07:02	07:43 (24) 06:52	20:33 (13) 05:25	
	17:01	17:55	97 17:13 (28) 18:45	242 18:07 (21) 20:38	183 17:42 (23) 21:27	10 20:43 (13) 22:03
15	08:44	08:00	15:06 (23) 07:00	07:42 (24) 06:50	20:33 (13) 05:25	
	17:02	17:57	98 17:11 (28) 18:47	247 18:09 (21) 20:39	178 17:41 (23) 21:29	11 20:44 (13) 22:03
16	08:43	07:58	15:03 (23) 06:58	07:40 (24) 06:48	20:34 (13) 05:25	
	17:04	17:59	97 17:08 (28) 18:49	252 18:10 (21) 20:41	172 17:40 (23) 21:30	12 20:46 (13) 22:04
17	08:43	07:56	15:01 (23) 06:56	07:39 (24) 06:46	20:33 (13) 05:25	
	17:05	18:01	91 16:32 (23) 18:50	257 18:12 (21) 20:43	167 17:39 (23) 21:32	13 20:46 (13) 22:04
18	08:42	07:54	14:59 (23) 06:53	07:39 (24) 06:43	20:34 (13) 05:25	
	17:07	18:03	95 16:34 (23) 18:52	260 18:14 (20) 20:44	163 17:39 (23) 21:33	14 20:48 (13) 22:05
19	08:41	07:52	14:57 (23) 06:51	07:37 (24) 06:41	20:35 (13) 05:25	
	17:09	18:04	99 16:36 (23) 18:54	264 18:15 (20) 20:46	156 17:38 (23) 21:35	15 20:50 (13) 22:05
20	08:40	07:50	14:56 (23) 06:49	07:36 (24) 06:39	20:35 (13) 05:25	
	17:10	18:06	101 16:37 (23) 18:56	268 18:17 (20) 20:48	149 17:37 (23) 21:36	16 20:51 (13) 22:05
21	08:39	07:48	14:54 (23) 06:46	07:36 (24) 06:37	20:36 (13) 05:25	
	17:12	18:08	105 16:39 (23) 18:57	271 18:19 (20) 20:49	141 17:36 (23) 21:37	16 20:52 (13) 22:06
22	08:37	07:46	14:53 (23) 06:44	07:35 (24) 06:35	20:36 (13) 05:25	
	17:14	18:10	109 17:30 (25) 18:59	273 18:21 (20) 20:51	134 17:35 (23) 21:39	17 20:53 (13) 22:06
23	08:36	07:44	14:51 (23) 06:42	07:34 (24) 06:33	20:37 (13) 05:26	
	17:15	18:12	113 17:31 (25) 19:01	276 18:22 (20) 20:53	124 17:34 (23) 21:40	17 20:54 (13) 22:06
24	08:35	07:42	14:49 (23) 06:39	07:33 (24) 06:31	20:38 (13) 05:26	
	17:17	18:13	117 17:33 (25) 19:02	275 18:21 (21) 20:55	110 17:33 (23) 21:42	16 20:54 (13) 22:06
25	08:34	07:40	14:48 (23) 06:37	07:33 (24) 06:29	20:39 (13) 05:26	
	17:19	18:15	119 17:35 (25) 19:04	274 18:19 (21) 20:56	94 17:32 (23) 21:43	15 20:54 (13) 22:06
26	08:33	07:38	14:47 (23) 06:35	07:32 (24) 06:27	20:40 (13) 05:27	
	17:21	18:17	117 16:44 (23) 19:06	268 18:13 (21) 20:58	90 17:30 (23) 21:44	12 20:52 (13) 22:06
27	08:31	07:35	14:46 (23) 06:33	07:32 (24) 06:25	20:42 (13) 05:27	
	17:22	18:19	120 16:46 (23) 19:07	261 18:08 (22) 21:00	89 20:18 (12) 21:45	10 20:52 (13) 22:06
28	08:30	07:33	14:44 (23) 06:30	07:32 (24) 06:23	20:44 (13) 05:28	
	17:24	18:21	122 16:46 (23) 19:09	259 18:07 (22) 21:01	87 20:20 (12) 21:47	6 20:50 (13) 22:06
29	08:28		07:28	08:30 (24) 06:21	05:28	
	17:26		20:11	257 19:05 (22) 21:03	83 20:21 (12) 21:48	22:06
30	08:27		07:26	08:30 (24) 06:19	05:29	
	17:28		20:12	252 19:03 (22) 21:05	80 20:23 (12) 21:49	22:06
31	08:26		07:23	08:30 (24)	05:33	
	17:30		20:14	247 19:01 (22)	21:50	
Potential sun hours	260	278	367	415	484	497
Total, worst case		2140	7026	4913	802	
Sun reduction		0,27	0,30	0,38	0,43	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,69	0,65	0,65	0,66	
Total reduction		0,18	0,19	0,24	0,27	
Total, real		390	1337	1199	220	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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Calculated:

21-11-2013 11:15/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December				
1	05:29		06:05	16:54 (23)	06:55	08:31 (24)	07:43	08:25 (24)	07:36	14:48 (23)	08:27				
	22:05		21:34	22	20:50 (13)	20:32	195	17:43 (23)	19:24	232	18:43 (22)	17:18	71	16:34 (28)	16:38
2	05:30		06:07		16:50 (23)	06:56		08:30 (24)	07:45		08:27 (24)	07:38		14:51 (23)	08:28
	22:05		21:32	30	20:49 (13)	20:30	198	17:43 (23)	19:21	223	18:41 (22)	17:16	63	16:32 (28)	16:38
3	05:31		06:08		16:45 (23)	06:58		08:29 (24)	07:46		08:27 (24)	07:40		14:55 (23)	08:29
	22:05		21:31	35	20:47 (13)	20:28	202	17:44 (23)	19:19	216	18:38 (22)	17:14	55	16:30 (28)	16:37
4	05:32		06:10		16:41 (23)	06:59		08:28 (24)	07:48		08:29 (24)	07:42		14:59 (23)	08:31
	22:04		21:29	40	17:21 (23)	20:26	205	17:43 (23)	19:17	209	18:36 (22)	17:13	44	16:28 (28)	16:36
5	05:32		06:12		16:38 (23)	07:01		08:27 (24)	07:50		08:31 (24)	07:43		15:05 (23)	08:32
	22:04		21:27	45	17:23 (23)	20:23	208	17:43 (23)	19:14	200	18:34 (22)	17:11	30	16:26 (28)	16:36
6	05:33		06:13		16:35 (23)	07:03		08:26 (24)	07:51		08:34 (24)	07:45		16:21 (28)	08:33
	22:03		21:25	50	17:25 (23)	20:21	211	17:43 (23)	19:12	190	18:32 (22)	17:09	3	16:24 (28)	16:35
7	05:34		06:15		16:32 (23)	07:04		08:25 (24)	07:53		08:35 (24)	07:47		16:21 (28)	08:35
	22:03		21:24	55	17:27 (23)	20:19	214	17:43 (23)	19:10	179	18:29 (22)	17:07	2	16:22 (28)	16:35
8	05:35		06:16		16:29 (23)	07:06		08:24 (24)	07:55		08:39 (24)	07:49			08:36
	22:02		21:22	59	17:28 (23)	20:17	215	17:43 (23)	19:08	164	18:27 (22)	17:06			16:35
9	05:36		06:18		16:26 (23)	07:07		08:24 (24)	07:56		08:44 (24)	07:50			08:37
	22:01		21:20	63	17:29 (23)	20:14	217	17:43 (23)	19:05	147	17:24 (23)	17:04			16:34
10	05:37		06:19		16:24 (23)	07:09		08:23 (24)	07:58		15:15 (23)	07:52			08:38
	22:01		21:18	67	17:31 (23)	20:12	229	18:46 (22)	19:03	128	17:23 (23)	17:03			16:34
11	05:38		06:21		16:21 (23)	07:11		08:23 (24)	08:00		15:15 (23)	07:54			08:39
	22:00		21:16	71	17:32 (23)	20:10	239	18:50 (22)	19:01	126	17:21 (23)	17:01			16:34
12	05:39		06:23		16:19 (23)	07:12		08:22 (24)	08:01		15:16 (23)	07:56			08:40
	21:59		21:14	77	20:33 (12)	20:07	246	18:52 (22)	18:59	125	17:21 (23)	16:59			16:34
13	05:40		06:24		16:16 (23)	07:14		08:22 (24)	08:03		15:17 (23)	07:57			08:41
	21:58		21:12	81	20:30 (12)	20:05	251	18:54 (22)	18:57	123	17:20 (23)	16:58			16:34
14	05:41		06:26		16:14 (23)	07:15		08:22 (24)	08:05		15:18 (23)	07:59			08:42
	21:57		21:10	84	20:29 (12)	20:03	256	18:56 (22)	18:54	121	17:19 (23)	16:57		4	15:22 (29)
15	05:42		06:27		16:11 (23)	07:17		08:21 (24)	08:06		15:19 (23)	08:01			08:43
	21:56		21:08	87	20:27 (12)	20:01	259	18:56 (22)	18:52	118	17:17 (23)	16:55		7	15:24 (29)
16	05:43	20:52 (13)	06:29		16:09 (23)	07:19		08:21 (24)	08:08		15:20 (23)	08:03			08:44
	21:55	8 21:00 (13)	21:06	88	17:37 (23)	19:58	261	18:57 (22)	18:50	120	18:09 (25)	16:54		8	15:25 (29)
17	05:45	20:50 (13)	06:30		16:06 (23)	07:20		08:20 (24)	08:10		15:20 (23)	08:04			08:45
	21:54	11 21:01 (13)	21:04	91	17:37 (23)	19:56	263	18:57 (22)	18:48	119	18:06 (25)	16:52		9	15:26 (29)
18	05:46	20:49 (13)	06:32		16:04 (23)	07:22		08:21 (24)	08:12		15:21 (23)	08:06			08:46
	21:53	14 21:03 (13)	21:02	94	17:38 (23)	19:54	271	19:05 (21)	18:46	115	18:03 (25)	16:51		10	15:28 (29)
19	05:47	20:49 (13)	06:34		08:58 (24)	07:23		08:20 (24)	08:13		15:23 (23)	08:08			08:46
	21:52	16 21:05 (13)	21:00	113	17:39 (23)	19:51	276	19:07 (21)	18:44	111	18:01 (25)	16:50		11	15:28 (29)
20	05:48	20:48 (13)	06:35		08:52 (24)	07:25		08:20 (24)	08:15		15:24 (23)	08:09			08:47
	21:51	17 21:05 (13)	20:58	125	17:39 (23)	19:49	276	19:08 (21)	18:42	108	17:59 (25)	16:49		11	15:29 (29)
21	05:50	20:47 (13)	06:37		08:50 (24)	07:27		08:21 (24)	08:17		15:25 (23)	08:11			08:47
	21:50	17 21:04 (13)	20:56	134	17:40 (23)	19:47	275	19:07 (20)	18:40	104	17:09 (23)	16:47		11	15:30 (29)
22	05:51	20:46 (13)	06:38		08:46 (24)	07:28		08:20 (24)	08:19		15:27 (23)	08:13			08:48
	21:48	17 21:03 (13)	20:54	143	17:40 (23)	19:44	273	19:04 (20)	18:38	100	17:07 (23)	16:46		11	15:30 (29)
23	05:52	20:45 (13)	06:40		08:45 (24)	07:30		08:21 (24)	08:20		15:28 (23)	08:14			08:48
	21:47	16 21:01 (13)	20:52	150	17:41 (23)	19:42	268	19:02 (20)	18:35	98	17:06 (23)	16:45		11	15:31 (29)
24	05:54	20:45 (13)	06:42		08:42 (24)	07:32		08:20 (24)	08:22		15:30 (23)	08:16			08:49
	21:46	16 21:01 (13)	20:50	156	17:41 (23)	19:40	266	18:59 (20)	18:33	94	17:04 (23)	16:44		11	15:31 (29)
25	05:55	20:45 (13)	06:43		08:41 (24)	07:33		08:21 (24)	07:24		14:32 (23)	08:18			08:49
	21:44	14 20:59 (13)	20:48	162	17:41 (23)	19:37	262	18:57 (20)	17:31	90	16:02 (23)	16:43		11	15:31 (29)
26	05:57	20:44 (13)	06:45		08:38 (24)	07:35		08:22 (24)	07:26		14:34 (23)	08:19			08:50
	21:43	14 20:58 (13)	20:46	169	17:41 (23)	19:35	257	18:55 (21)	17:29	97	16:39 (28)	16:42		9	15:30 (29)
27	05:58	20:44 (13)	06:47		08:37 (24)	07:36		08:22 (24)	07:27		14:36 (23)	08:21			08:50
	21:42	12 20:56 (13)	20:43	173	17:42 (23)	19:33	252	18:52 (21)	17:27	98	16:41 (28)	16:41		8	15:30 (29)
28	06:00	20:44 (13)	06:48		08:35 (24)	07:38		08:23 (24)	07:29		14:38 (23)	08:22			08:50
	21:40	12 20:56 (13)	20:41	179	17:42 (23)	19:30	248	18:50 (21)	17:26	96	16:42 (28)	16:40		7	15:31 (29)
29	06:01	20:44 (13)	06:50		08:34 (24)	07:40		08:24 (24)	07:31		14:40 (23)	08:24			08:50
	21:39	10 20:54 (13)	20:39	184	17:43 (23)	19:28	242	18:48 (21)	17:24	91	16:40 (28)	16:40		6	15:31 (29)
30	06:02	20:43 (13)	06:51		08:33 (24)	07:41		08:24 (24)	07:33		14:42 (23)	08:25			08:50
	21:37	9 20:52 (13)	20:37	186	17:42 (23)	19:26	237	18:45 (21)	17:22	86	16:38 (28)	16:39		3	15:29 (29)
31	06:04	20:44 (13)	06:53		08:32 (24)			07:34			14:45 (23)				08:50
	21:35	8 20:52 (13)	20:35	192	17:43 (23)			17:20		79	16:36 (28)				16:43
Potential sun hours	501		453		381		332		267		245				
Total, worst case	211		3205		7272		4107		268		148				
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16				
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97				
Wind dir. red.	0,56		0,67		0,64		0,68		0,69		0,72				
Total reduction	0,22		0,27		0,22		0,20		0,15		0,11				
Total, real	46		878		1634		828		40		17				

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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Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	07:57 (2) 08:35 (2)	06:17 21:06
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:54 (2) 08:34 (2)	06:15 21:08
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:53 (2) 08:34 (2)	06:13 21:10
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	07:53 (2) 08:33 (2)	06:11 21:11
5	08:50 16:49	08:18 17:39	07:23 18:30	07:12 20:23	07:53 (2) 08:33 (2)	06:10 21:13
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	07:53 (2) 08:31 (2)	06:08 21:15
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	07:53 (2) 08:31 (2)	06:06 21:16
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	07:54 (2) 08:30 (2)	06:04 21:18
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	07:54 (2) 08:29 (2)	06:03 21:19
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	07:55 (2) 08:28 (2)	06:01 21:21
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	07:56 (2) 08:26 (2)	05:59 21:23
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	07:57 (2) 08:23 (2)	05:58 21:24
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36	07:58 (2) 08:21 (2)	05:56 21:26
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38	07:28 (5) 08:19 (2)	05:54 21:27
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	07:26 (5) 08:14 (2)	05:53 21:29
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	07:24 (5) 07:31 (5)	05:51 21:30
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43	07:22 (5) 07:31 (5)	05:50 21:32
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45	07:20 (5) 07:31 (5)	05:48 21:33
19	08:41 17:09	07:52 18:05	06:51 18:54	06:41 20:46	07:18 (5) 07:31 (5)	05:47 21:35
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	07:16 (5) 07:31 (5)	05:46 21:36
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50	07:14 (5) 07:30 (5)	05:44 21:38
22	08:38 17:14	07:46 09:22 (6)	06:44 18:59	06:35 20:51	07:12 (5) 07:30 (5)	05:43 21:39
23	08:36 17:15	07:44 09:20 (6)	06:42 19:01	06:33 20:53	07:10 (5) 07:29 (5)	05:42 21:40
24	08:35 17:17	07:42 09:23 (6)	06:40 19:02	06:31 20:55	07:08 (5) 07:28 (5)	05:40 21:42
25	08:34 17:19	07:40 09:17 (6)	06:37 19:04	06:29 20:56	07:07 (5) 07:27 (5)	05:39 21:43
26	08:33 17:21	07:38 09:16 (6)	06:35 19:06	06:27 20:58	07:08 (5) 07:25 (5)	05:38 21:44
27	08:31 17:22	07:36 09:14 (6)	06:33 19:08	06:25 21:00	07:09 (5) 07:23 (5)	05:37 21:46
28	08:30 17:24	07:33 09:15 (6)	06:30 19:09	06:23 21:01	07:11 (5) 07:20 (5)	05:36 21:47
29	08:29 17:26	18:21	07:28 20:11	06:21 21:03		05:35 21:48
30	08:27 17:28		07:26 20:13	06:19 21:05		05:34 21:49
31	08:26 17:30		07:24 20:14	06:17 21:05		05:33 21:51
Potential sun hours	260	278	367	416	484	497
Total, worst case	29	166	287	681		
Sun reduction	0,18	0,27	0,30	0,38		
Oper. time red.	0,97	0,97	0,97	0,97		
Wind dir. red.	0,56	0,56	0,59	0,60		
Total reduction	0,10	0,15	0,17	0,23		
Total, real	3	24	50	153		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06	06:06 21:34	06:55 20:33	07:55 (2) 08:25 (2)	07:43 19:24	08:21 (7) 17:18
2	05:30 22:05	06:07 21:32	06:56 20:30	07:53 (2) 08:26 (2)	07:45 19:21	08:23 (7) 17:16
3	05:31 22:05	06:09 21:31	06:58 20:28	07:52 (2) 08:27 (2)	07:46 19:19	08:25 (7) 17:14
4	05:32 22:04	06:10 21:29	07:00 20:26	07:51 (2) 08:27 (2)	07:48 19:17	07:42 17:13
5	05:32 22:04	06:12 21:27	07:01 20:24	07:50 (2) 08:28 (2)	07:50 19:15	07:43 17:11
6	05:33 22:03	06:13 21:26	07:03 20:21	07:49 (2) 08:27 (2)	07:51 19:12	07:45 17:09
7	05:34 22:03	06:15 21:24	07:04 20:19	07:48 (2) 08:28 (2)	07:53 19:10	07:47 17:08
8	05:35 22:02	06:16 21:22	07:06 20:17	07:47 (2) 08:27 (2)	07:55 19:08	07:49 17:06
9	05:36 22:02	06:18 21:20	07:08 20:14	07:47 (2) 08:28 (2)	07:56 19:06	07:51 17:04
10	05:37 22:01	06:19 21:18	07:09 20:12	07:47 (2) 08:27 (2)	07:58 19:03	07:52 17:03
11	05:38 22:00	06:21 21:16	07:11 20:10	07:49 (2) 08:27 (2)	08:00 19:01	07:54 17:01
12	05:39 21:59	06:23 21:15	07:12 20:08	07:51 (2) 08:27 (2)	08:02 18:59	07:56 17:00
13	05:40 21:58	06:24 21:13	07:14 20:05	07:52 (2) 08:26 (2)	08:03 18:57	07:58 16:58
14	05:41 21:58	06:26 21:11	07:16 20:03	07:54 (2) 08:26 (2)	08:05 18:55	07:59 16:57
15	05:42 21:57	06:27 21:09	07:17 20:01	07:55 (2) 08:24 (2)	08:07 18:52	08:01 16:55
16	05:44 21:56	06:29 21:07	07:19 20:00	07:57 (2) 08:24 (2)	08:08 18:50	08:03 16:54
17	05:45 21:54	06:31 21:05	07:20 20:00	07:58 (2) 08:22 (2)	08:10 18:48	08:05 16:52
18	05:46 21:53	06:32 21:03	07:22 20:00	08:00 (2) 08:21 (2)	08:12 18:46	08:06 16:51
19	05:47 21:52	06:34 21:01	07:24 20:00	08:02 (2) 08:20 (2)	08:13 18:44	08:08 16:50
20	05:49 21:51	06:35 20:59	07:25 20:00	08:03 (2) 08:17 (2)	08:15 18:42	08:10 16:49
21	05:50 21:50	06:37 20:56	07:27 20:00	08:05 (2) 08:15 (2)	08:17 18:40	08:11 16:48
22	05:51 21:49	06:39 20:54	07:28 20:00	08:06 (2) 08:12 (2)	08:19 18:38	08:13 16:46
23	05:53 21:47	06:40 20:52	07:30 20:00	08:20 (2) 07:35 (5)	08:20 18:36	08:15 16:45
24	05:54 21:46	06:42 20:50	07:32 20:00	08:22 (2) 07:35 (5)	08:22 18:34	08:16 16:44
25	05:55 21:45	06:43 20:48	07:33 20:00	08:24 (2) 07:34 (5)	08:24 18:32	08:18 16:43
26	05:57 21:43	06:45 20:46	07:35 20:00	08:26 (2) 07:34 (5)	08:26 18:30	08:20 16:42
27	05:58 21:42	06:47 20:44	07:37 20:00	08:27 (2) 07:33 (5)	08:27 18:28	08:21 16:41
28	06:00 21:40	06:48 20:41	07:38 20:00	08:28 (2) 07:31 (5)	08:28 18:26	08:22 16:40
29	06:01 21:39	06:50 20:39	07:40 20:00	08:29 (2) 07:31 (5)	08:29 18:24	08:23 16:39
30	06:03 21:37	06:51 20:37	07:41 20:00	08:30 (2) 07:33 (5)	08:30 18:22	08:24 16:38
31	06:04 21:36	06:53 20:35	07:52 (2) 08:23 (2)	07:35 17:20	08:17 (4) 08:19 (4)	08:25 16:37
Potential sun hours	501	453	381	332	267	245
Total, worst case		276	693	179	30	
Sun reduction		0,42	0,36	0,31	0,22	
Oper. time red.		0,97	0,97	0,97	0,97	
Wind dir. red.		0,61	0,60	0,56	0,56	
Total reduction		0,25	0,21	0,17	0,12	
Total, real		69	144	30	4	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:40 (6)	08:24	09:06 (4)	07:31	08:08 (7)	07:21	08:37 (2)	06:17	05:32	
	16:44	8	09:48 (6)	17:31	25	09:31 (4)	18:23	6	08:14 (7)	20:16	21:52	
2	08:51		09:40 (6)	08:23	09:04 (4)	07:29	08:06 (7)	07:19	08:37 (2)	06:15	05:31	
	16:45	8	09:48 (6)	17:33	27	09:31 (4)	18:24	8	08:14 (7)	20:18	21:53	
3	08:50		09:40 (6)	08:21	09:03 (4)	07:27	08:04 (7)	07:17	08:39 (2)	06:13	05:31	
	16:46	9	09:49 (6)	17:35	27	09:30 (4)	18:26	14	08:18 (2)	20:19	21:54	
4	08:50		09:39 (6)	08:20	09:04 (4)	07:25	08:01 (2)	07:14	08:40 (2)	06:11	05:30	
	16:47	9	09:48 (6)	17:37	26	09:30 (4)	18:28	20	08:21 (2)	20:21	21:55	
5	08:50		09:39 (6)	08:18	09:06 (4)	07:23	07:59 (2)	07:12	08:42 (2)	06:10	05:29	
	16:48	10	09:49 (6)	17:39	24	09:30 (4)	18:30	25	08:24 (2)	20:23	21:56	
6	08:50		09:38 (6)	08:16	09:07 (4)	07:20	07:57 (2)	07:10	08:43 (2)	06:08	05:29	
	16:50	10	09:48 (6)	17:41	22	09:29 (4)	18:31	30	08:27 (2)	20:24	21:57	
7	08:49		09:38 (6)	08:15	09:08 (4)	07:18	07:54 (2)	07:08	08:45 (2)	06:06	05:28	
	16:51	11	09:49 (6)	17:42	19	09:27 (4)	18:33	34	08:28 (2)	20:26	21:58	
8	08:49		09:37 (6)	08:13	09:10 (4)	07:16	07:52 (2)	07:05	07:41 (5)	06:04	05:28	
	16:52	11	09:48 (6)	17:44	16	09:26 (4)	18:35	38	08:30 (2)	20:28	21:59	
9	08:48		09:39 (6)	08:11	09:12 (4)	07:14	07:50 (2)	07:03	07:39 (5)	06:03	05:27	
	16:54	8	09:47 (6)	17:46	11	09:23 (4)	18:37	41	08:31 (2)	20:29	21:59	
10	08:48		09:41 (6)	08:09	07:12	07:01	07:48 (2)	07:01	07:37 (5)	06:01	05:27	
	16:55	4	09:45 (6)	17:48	18:38	44	08:32 (2)	20:31	9	07:46 (5)	21:21	22:00
11	08:47		08:07	07:09	07:45 (2)	06:59	07:35 (5)	05:59	07:35 (5)	05:59	05:26	
	16:56		17:50	18:40	48	08:33 (2)	20:33	12	07:47 (5)	21:23	22:01	
12	08:47		08:06	07:07	07:43 (2)	06:57	07:32 (5)	05:58	07:32 (5)	05:58	05:26	
	16:58		17:52	18:42	51	08:34 (2)	20:35	15	07:47 (5)	21:24	22:02	
13	08:46		08:04	07:05	07:41 (2)	06:54	07:30 (5)	05:56	07:30 (5)	05:56	05:26	
	16:59		17:53	18:44	53	08:34 (2)	20:36	17	07:47 (5)	21:26	22:02	
14	08:45		08:02	07:02	07:39 (2)	06:52	07:28 (5)	05:54	07:28 (5)	05:54	05:25	
	17:01		17:55	18:45	55	08:34 (2)	20:38	20	07:48 (5)	21:27	22:03	
15	08:44		08:00	07:00	07:39 (2)	06:50	07:26 (5)	05:53	07:26 (5)	05:53	05:25	
	17:02		17:57	18:47	56	08:35 (2)	20:40	22	07:48 (5)	21:29	22:03	
16	08:44		07:58	06:58	07:38 (2)	06:48	07:24 (5)	05:51	07:24 (5)	05:51	05:25	
	17:04		17:59	18:49	57	08:35 (2)	20:41	24	07:48 (5)	21:30	22:04	
17	08:43		07:56	06:56	07:37 (2)	06:46	07:22 (5)	05:50	07:22 (5)	05:50	05:25	
	17:05		18:01	18:51	58	08:35 (2)	20:43	26	07:48 (5)	21:32	22:04	
18	08:42		07:54	06:53	07:37 (2)	06:43	07:20 (5)	05:48	07:20 (5)	05:48	05:25	
	17:07		18:03	18:52	58	08:35 (2)	20:45	27	07:47 (5)	21:33	22:05	
19	08:41		07:52	06:51	07:36 (2)	06:41	07:18 (5)	05:47	07:18 (5)	05:47	05:25	
	17:09		18:04	18:54	59	08:35 (2)	20:46	29	07:47 (5)	21:35	22:05	
20	08:40		07:50	06:49	07:35 (2)	06:39	07:16 (5)	05:46	07:16 (5)	05:46	05:25	
	17:10	2	09:27 (4)	18:06	18:56	59	08:34 (2)	20:48	31	07:47 (5)	21:36	22:05
21	08:39		09:23 (4)	07:48	06:47	07:35 (2)	06:37	07:14 (5)	07:14 (5)	05:44	05:25	
	17:12	4	09:27 (4)	18:08	18:57	59	08:34 (2)	20:50	32	07:46 (5)	21:38	22:06
22	08:38		09:22 (4)	07:46	06:44	07:35 (2)	06:35	07:15 (5)	07:15 (5)	05:43	05:26	
	17:14	6	09:28 (4)	18:10	18:59	59	08:34 (2)	20:51	30	07:45 (5)	21:39	22:06
23	08:36		09:20 (4)	07:44	06:42	07:34 (2)	06:33	07:15 (5)	07:15 (5)	05:42	05:26	
	17:15	8	09:28 (4)	18:12	19:01	59	08:33 (2)	20:53	29	07:44 (5)	21:40	22:06
24	08:35		09:19 (4)	07:42	06:40	07:35 (2)	06:31	07:16 (5)	07:16 (5)	05:40	05:26	
	17:17	10	09:29 (4)	18:14	19:02	58	08:33 (2)	20:55	27	07:43 (5)	21:42	22:06
25	08:34		09:17 (4)	07:40	06:37	07:35 (2)	06:29	07:16 (5)	07:16 (5)	05:39	05:26	
	17:19	13	09:30 (4)	18:15	19:04	57	08:32 (2)	20:56	26	07:42 (5)	21:43	22:06
26	08:33		09:16 (4)	07:38	06:35	07:34 (2)	06:27	07:17 (5)	07:17 (5)	05:38	05:27	
	17:21	15	09:31 (4)	18:17	19:06	57	08:31 (2)	20:58	23	07:40 (5)	21:44	22:06
27	08:31		09:14 (4)	07:36	06:33	07:35 (2)	06:25	07:19 (5)	07:19 (5)	05:37	05:27	
	17:22	17	09:31 (4)	18:19	19:08	55	08:30 (2)	21:00	19	07:38 (5)	21:46	22:06
28	08:30		09:13 (4)	07:33	08:10 (7)	06:30	07:35 (2)	06:23	07:20 (5)	05:36	05:28	
	17:24	18	09:31 (4)	18:21	3	08:13 (7)	19:09	55	08:30 (2)	21:01	21:47	22:06
29	08:29		09:11 (4)	07:28	07:28	55	08:36 (2)	06:21	16	07:36 (5)	21:47	22:06
	17:26	20	09:31 (4)	07:26	20:11	53	09:29 (2)	21:03	9	07:33 (5)	21:48	22:06
30	08:27		09:09 (4)	07:26	07:26	53	08:36 (2)	06:19		05:34	05:29	
	17:28	22	09:31 (4)	07:26	20:13	51	09:27 (2)	21:05		21:49	22:06	
31	08:26		09:08 (4)	07:24	07:24	50	08:36 (2)			05:33		
	17:30	24	09:32 (4)	07:24	20:14	50	09:26 (2)			21:51		
Potential sun hours	260		278		367		416		484		497	
Total, worst case	247		200		1427		731					
Sun reduction	0,18		0,27		0,30		0,38					
Oper. time red.	0,97		0,97		0,97		0,97					
Wind dir. red.	0,56		0,56		0,55		0,59					
Total reduction	0,10		0,15		0,16		0,22					
Total, real	25		29		229		161					

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 2: Dubbele lijn overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:15/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:05	06:06 21:34	06:55 20:33	07:34 (5) 19:24	07:43 19:13 (2)	08:27 17:18
2	05:30 22:05	06:07 21:32	06:56 20:30	07:35 (5) 19:21	07:45 19:12 (2)	08:28 17:16
3	05:31 22:05	06:09 21:31	06:58 20:28	07:37 (5) 19:19	07:46 19:11 (2)	08:29 (4) 17:14
4	05:32 22:04	06:10 21:29	07:00 20:26	07:38 (5) 19:17	07:48 19:09 (2)	08:31 17:13
5	05:32 22:04	06:12 21:27	07:01 20:24	08:43 (2) 19:15	07:50 19:07 (2)	08:32 17:11
6	05:33 22:03	06:13 21:26	07:03 20:21	08:39 (2) 19:12	07:51 19:09 (2)	08:34 17:09
7	05:34 22:03	06:15 21:24	07:04 20:19	08:37 (2) 19:10	07:53 19:12 (2)	08:35 17:08
8	05:35 22:02	06:16 21:22	07:06 20:17	08:34 (2) 19:08	07:55 19:13 (2)	08:36 17:06
9	05:36 22:02	06:18 21:20	07:08 20:14	08:33 (2) 19:06	07:56 19:15 (2)	08:37 17:04
10	05:37 22:01	06:19 21:18	07:09 20:12	08:31 (2) 19:03	07:58 19:15 (2)	08:38 17:03
11	05:38 22:00	06:21 21:16	07:11 20:10	08:30 (2) 19:01	07:54 19:17 (2)	08:39 17:01
12	05:39 21:59	06:23 21:15	07:12 20:08	08:29 (2) 18:59	07:56 19:18 (2)	08:40 17:00
13	05:40 21:58	06:24 21:13	07:14 20:05	08:27 (2) 18:57	07:58 19:18 (2)	08:41 16:58
14	05:41 21:57	06:26 21:11	07:16 20:03	08:26 (2) 18:55	07:59 19:19 (2)	08:42 16:57
15	05:42 21:57	06:27 21:09	07:17 20:01	08:25 (2) 18:52	08:01 19:19 (2)	08:43 16:55
16	05:44 21:56	06:29 21:07	07:19 19:58	08:24 (2) 18:50	08:03 19:20 (2)	08:44 16:54
17	05:45 21:54	06:31 21:05	07:20 19:56	08:23 (2) 18:48	08:05 19:19 (2)	08:45 16:52
18	05:46 21:53	06:32 21:03	07:22 19:54	08:22 (2) 18:46	08:06 19:20 (2)	08:46 16:51
19	05:47 21:52	06:34 21:01	07:24 19:51	08:22 (2) 18:44	08:08 19:20 (2)	08:46 16:50
20	05:49 21:51	06:35 20:58	07:25 19:49	08:21 (2) 18:42	08:10 19:19 (2)	08:47 16:49
21	05:50 21:50	06:37 20:56	07:27 19:47	08:21 (2) 18:40	08:11 19:20 (2)	08:48 16:47
22	05:51 21:49	06:39 20:54	07:28 19:44	08:20 (2) 18:38	08:13 19:19 (2)	08:48 16:46
23	05:53 21:47	06:40 20:52	07:30 19:42	08:20 (2) 18:36	08:15 19:20 (2)	08:49 16:45
24	05:54 21:46	06:42 20:50	07:32 19:40	08:20 (2) 18:34	08:16 19:19 (2)	08:49 16:44
25	05:55 21:45	06:43 20:48	07:33 19:37	08:19 (2) 18:32	08:18 19:20 (2)	08:50 16:43
26	05:57 21:43	06:45 20:46	07:35 19:35	08:19 (2) 18:30	08:19 19:17 (2)	08:50 16:42
27	05:58 21:42	06:47 20:44	07:37 19:33	08:20 (2) 18:28	08:21 19:17 (2)	08:50 16:41
28	06:00 21:40	06:48 20:41	07:38 19:31	08:19 (2) 18:26	08:22 19:16 (2)	08:50 16:40
29	06:01 21:39	06:50 20:39	07:40 19:28	08:20 (2) 18:24	08:24 19:15 (2)	08:50 16:40
30	06:03 21:37	06:51 20:37	07:41 19:26	08:20 (2) 18:22	08:25 19:15 (2)	08:51 16:39
31	06:04 21:36	06:53 20:35	07:42 19:24	07:35 17:20	07:35 17:20	08:51 16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case		425	1377	390	362	210
Sun reduction		0,42	0,36	0,31	0,22	0,16
Oper. time red.		0,97	0,97	0,97	0,97	0,97
Wind dir. red.		0,62	0,55	0,55	0,56	0,56
Total reduction		0,25	0,19	0,16	0,12	0,09
Total, real		108	264	63	44	19

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:20/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (31)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:40 (9)	08:24	09:06 (8)	07:31	08:08 (11)	07:21	18:29 (1)	06:17	06:55 (13)	05:32
	16:44	86	15:51 (2)	17:31	09:32 (8)	18:23	08:20 (11)	20:16	19:22 (1)	21:06	07:28 (10)	21:52
2	08:51		09:40 (9)	08:23	09:04 (8)	07:29	08:06 (11)	07:19	07:54 (16)	06:15	06:53 (13)	05:32
	16:45	86	15:52 (2)	17:33	09:32 (8)	18:24	08:20 (11)	20:18	19:21 (1)	21:08	07:26 (10)	21:53
3	08:50		09:40 (9)	08:21	09:02 (8)	07:27	08:04 (11)	07:17	07:52 (16)	06:13	06:51 (13)	05:31
	16:46	89	15:54 (2)	17:35	09:32 (8)	18:26	08:19 (11)	20:19	19:20 (1)	21:10	07:25 (10)	21:54
4	08:50		09:39 (9)	08:19	09:00 (8)	07:25	08:01 (11)	07:14	07:50 (16)	06:11	06:50 (7)	05:30
	16:47	89	15:55 (2)	17:37	09:32 (8)	18:28	08:18 (11)	20:21	19:19 (1)	21:11	07:24 (10)	21:55
5	08:50		09:39 (9)	08:18	08:59 (8)	07:23	07:59 (11)	07:12	07:48 (16)	06:10	06:48 (7)	05:29
	16:49	89	15:56 (2)	17:39	09:34 (8)	18:30	08:17 (11)	20:23	19:19 (1)	21:13	07:22 (10)	21:56
6	08:50		09:38 (9)	08:16	08:57 (8)	07:20	07:59 (11)	07:10	07:45 (16)	06:08	06:46 (7)	05:29
	16:50	90	15:57 (2)	17:41	09:34 (8)	18:31	08:16 (11)	20:24	19:17 (1)	21:15	07:20 (10)	21:57
7	08:49		09:37 (9)	08:14	08:55 (8)	07:18	08:00 (11)	07:08	18:31 (1)	06:06	06:45 (7)	05:28
	16:51	90	15:57 (2)	17:42	09:33 (8)	18:33	08:13 (11)	20:26	19:16 (1)	21:16	07:18 (10)	21:58
8	08:49		09:37 (9)	08:13	08:55 (8)	07:16	08:04 (11)	07:05	18:32 (1)	06:04	06:43 (7)	05:28
	16:52	89	15:58 (2)	17:44	09:33 (8)	18:35	08:08 (11)	20:28	19:15 (1)	21:18	07:14 (7)	21:58
9	08:48		09:36 (9)	08:11	08:51 (14)	07:14		07:03	18:34 (1)	06:03	06:42 (7)	05:27
	16:54	90	15:59 (2)	17:46	09:33 (8)	18:37		20:29	19:13 (1)	21:19	07:16 (7)	21:59
10	08:48		09:35 (9)	08:09	08:49 (14)	07:12		07:01	18:35 (1)	06:01	06:40 (7)	05:27
	16:55	88	15:59 (2)	17:48	09:33 (8)	18:38		20:31	19:12 (1)	21:21	07:17 (7)	22:00
11	08:47		09:34 (9)	08:07	08:47 (14)	07:09	17:59 (1)	06:59	18:37 (1)	05:59	06:39 (7)	05:26
	16:56	86	15:59 (2)	17:50	09:32 (8)	18:40	18:01 (1)	20:33	19:10 (1)	21:23	07:18 (7)	22:01
12	08:47		09:34 (9)	08:06	08:45 (14)	07:07	17:52 (1)	06:57	18:38 (1)	05:58	06:37 (7)	05:26
	16:58	85	16:00 (2)	17:52	09:32 (8)	18:42	18:03 (1)	20:34	19:07 (1)	21:24	07:19 (7)	22:02
13	08:46		09:33 (9)	08:04	08:43 (14)	07:05	17:48 (1)	06:54	18:40 (1)	05:56	06:36 (7)	05:26
	16:59	81	16:00 (2)	17:54	09:31 (8)	18:44	18:06 (1)	20:36	19:04 (1)	21:26	07:20 (7)	22:02
14	08:45		09:32 (9)	08:02	08:41 (14)	07:02	17:45 (1)	06:52	18:44 (1)	05:54	06:34 (7)	05:26
	17:01	78	16:00 (2)	17:55	09:30 (8)	18:45	18:07 (1)	20:38	19:01 (1)	21:27	07:20 (7)	22:03
15	08:44		09:31 (9)	08:00	09:00 (8)	07:00	17:43 (1)	06:50	07:26 (10)	05:53	06:33 (7)	05:25
	17:02	73	16:01 (2)	17:57	09:29 (8)	18:47	18:09 (1)	20:40	07:27 (10)	21:29	07:22 (7)	22:03
16	08:44		09:30 (9)	07:58	09:01 (8)	06:58	17:41 (1)	06:48	07:24 (10)	05:51	06:32 (7)	05:25
	17:04	58	16:00 (2)	17:59	09:28 (8)	18:49	18:11 (1)	20:41	07:28 (10)	21:30	07:23 (7)	22:04
17	08:43		09:31 (9)	07:56	09:03 (8)	06:56	17:39 (1)	06:46	07:22 (10)	05:50	06:31 (7)	05:25
	17:06	56	16:00 (2)	18:01	09:26 (8)	18:51	18:12 (1)	20:43	07:29 (10)	21:32	07:24 (7)	22:04
18	08:42		09:33 (9)	07:54	09:04 (8)	06:53	17:37 (1)	06:44	07:20 (10)	05:48	06:29 (7)	05:25
	17:07	53	16:00 (2)	18:03	09:23 (8)	18:52	18:14 (1)	20:45	07:30 (10)	21:33	07:24 (7)	22:05
19	08:41		09:34 (9)	07:52	09:07 (8)	06:51	17:36 (1)	06:41	07:18 (10)	05:47	06:28 (7)	05:25
	17:09	50	16:00 (2)	18:05	09:20 (8)	18:54	18:16 (1)	20:46	07:31 (10)	21:35	07:24 (7)	22:05
20	08:40		09:36 (9)	07:50		06:49	17:34 (1)	06:39	07:16 (10)	05:46	06:27 (7)	05:25
	17:10	45	15:59 (2)	18:06		18:56	18:17 (1)	20:48	07:31 (10)	21:36	07:25 (7)	22:05
21	08:39		09:39 (9)	07:48		06:47	17:34 (1)	06:37	07:14 (10)	05:44	06:26 (7)	05:25
	17:12	40	16:00 (2)	18:08		18:57	18:19 (1)	20:50	07:31 (10)	21:38	07:26 (7)	22:06
22	08:38		15:27 (2)	07:46		06:44	17:33 (1)	06:35	07:12 (10)	05:43	06:26 (7)	05:26
	17:14	33	16:00 (2)	18:10		18:59	18:21 (1)	20:51	07:32 (10)	21:39	07:26 (7)	22:06
23	08:36		09:20 (8)	07:44		06:42	17:32 (1)	06:33	07:10 (10)	05:42	06:26 (7)	05:26
	17:16	32	15:58 (2)	18:12		19:01	18:22 (1)	20:53	07:32 (10)	21:40	07:27 (7)	22:06
24	08:35		09:19 (8)	07:42		06:40	17:31 (1)	06:31	07:08 (10)	05:41	06:25 (7)	05:26
	17:17	33	15:58 (2)	18:14		19:02	18:24 (1)	20:55	07:31 (10)	21:42	07:27 (7)	22:06
25	08:34		09:17 (8)	07:40	08:17 (11)	06:37	17:31 (1)	06:29	07:06 (10)	05:39	06:25 (7)	05:26
	17:19	34	15:57 (2)	18:15	08:20 (11)	19:04	18:24 (1)	20:56	07:31 (10)	21:43	07:27 (7)	22:06
26	08:33		09:16 (8)	07:38	08:15 (11)	06:35	17:30 (1)	06:27	07:04 (10)	05:38	06:25 (7)	05:27
	17:21	34	15:56 (2)	18:17	08:20 (11)	19:06	18:24 (1)	20:58	07:31 (10)	21:44	07:28 (7)	22:06
27	08:31		09:14 (8)	07:36	08:13 (11)	06:33	17:29 (1)	06:25	07:02 (10)	05:37	06:25 (7)	05:27
	17:22	35	15:55 (2)	18:19	08:21 (11)	19:08	18:24 (1)	21:00	07:30 (10)	21:46	07:28 (7)	22:06
28	08:30		09:13 (8)	07:33	08:10 (11)	06:30	17:29 (1)	06:23	07:00 (10)	05:36	06:25 (7)	05:28
	17:24	32	15:53 (2)	18:21	08:20 (11)	19:09	18:24 (1)	21:01	07:29 (10)	21:47	07:28 (7)	22:06
29	08:29		09:11 (8)			07:28	18:29 (1)	06:21	06:59 (10)	05:35	06:24 (7)	05:28
	17:26	28	15:50 (2)			20:11	19:24 (1)	21:03	07:30 (10)	21:48	07:28 (7)	22:06
30	08:27		09:09 (8)			07:26	18:29 (1)	06:19	06:57 (13)	05:34	06:24 (7)	05:29
	17:28	21	09:30 (8)			20:13	19:23 (1)	21:05	07:29 (10)	21:49	07:28 (7)	22:06
31	08:26		09:08 (8)			07:24	18:29 (1)			05:33	06:24 (7)	
	17:30	24	09:32 (8)			20:14	19:22 (1)			21:50	07:28 (7)	
Potential sun hours	260			278		367		416		484		497
Total, worst case	1897			639		947		888		1515		1969
Sun reduction	0,18			0,27		0,30		0,38		0,43		0,38
Oper. time red.	0,97			0,97		0,97		0,97		0,97		0,97
Wind dir. red.	0,66			0,56		0,61		0,62		0,66		0,66
Total reduction	0,12			0,15		0,18		0,23		0,27		0,25
Total, real	224			95		170		206		415		484

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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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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17-03-2014 15:07 / 2

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (31)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:29 (7)	06:06	06:48 (7)	06:55	18:36 (1)	07:43	18:29 (1)	07:36	08:19 (14)	08:27
	22:05	66	07:35 (7)	21:34	07:29 (7)	20:33	19:09 (1)	19:24	18:43 (1)	17:18	09:02 (8)	16:38
2	05:30		06:30 (7)	06:07	06:50 (7)	06:56	18:33 (1)	07:45	18:34 (1)	07:38	08:21 (14)	08:28
	22:05	66	07:36 (7)	21:32	07:28 (7)	20:30	19:10 (1)	19:21	18:41 (1)	17:16	09:03 (8)	16:38
3	05:31		06:31 (7)	06:09	06:51 (7)	06:58	18:32 (1)	07:46		07:40	08:25 (8)	08:30
	22:05	65	07:36 (7)	21:31	07:27 (7)	20:28	19:11 (1)	19:19		17:14	09:03 (8)	16:37
4	05:32		06:30 (7)	06:10	06:52 (7)	07:00	18:29 (1)	07:48		07:42	08:25 (8)	08:31
	22:04	66	07:36 (7)	21:29	07:25 (7)	20:26	19:12 (1)	19:17		17:13	09:03 (8)	16:36
5	05:32		06:31 (7)	06:12	06:54 (7)	07:01	18:28 (1)	07:50		07:43	08:27 (8)	08:32
	22:04	65	07:36 (7)	21:27	07:24 (7)	20:24	19:13 (1)	19:15		17:11	09:03 (8)	16:36
6	05:33		06:31 (7)	06:13	06:55 (7)	07:03	18:26 (1)	07:51	08:38 (11)	07:45	08:29 (8)	08:34
	22:03	65	07:36 (7)	21:26	07:28 (10)	20:21	19:13 (1)	19:12	10	08:48 (11)	17:09	09:03 (8)
7	05:34		06:31 (7)	06:15	06:57 (7)	07:04	07:43 (16)	07:53	08:36 (11)	07:47	08:31 (8)	08:35
	22:03	66	07:37 (7)	21:24	07:31 (10)	20:19	19:14 (1)	19:10	15	08:51 (11)	17:08	09:03 (8)
8	05:35		06:32 (7)	06:16	06:58 (7)	07:06	07:44 (16)	07:55	08:33 (11)	07:49	08:33 (8)	08:36
	22:02	65	07:37 (7)	21:22	07:32 (10)	20:17	19:14 (1)	19:08	18	08:51 (11)	17:06	09:03 (8)
9	05:36		06:31 (7)	06:18	07:00 (7)	07:08	07:46 (16)	07:56	08:35 (11)	07:51	08:35 (8)	08:37
	22:02	65	07:36 (7)	21:20	07:34 (10)	20:14	19:14 (1)	19:06	17	08:52 (11)	17:04	09:03 (8)
10	05:37		06:31 (7)	06:19	07:01 (13)	07:09	07:47 (16)	07:58	08:37 (11)	07:52	08:37 (8)	08:38
	22:01	65	07:36 (7)	21:18	07:35 (10)	20:12	19:14 (1)	19:03	16	08:53 (11)	17:03	09:03 (8)
11	05:38		06:32 (7)	06:21	07:02 (13)	07:11	18:21 (1)	08:00	08:39 (11)	07:54	08:39 (8)	08:39
	22:00	65	07:37 (7)	21:16	07:35 (10)	20:10	19:14 (1)	19:01	15	08:54 (11)	17:01	09:02 (8)
12	05:39		06:32 (7)	06:23	07:04 (13)	07:12	18:21 (1)	08:01	08:40 (11)	07:56	08:41 (8)	08:40
	21:59	65	07:37 (7)	21:14	07:36 (10)	20:08	19:15 (1)	18:59	13	08:53 (11)	17:00	09:02 (8)
13	05:40		06:32 (7)	06:24	07:05 (13)	07:14	18:20 (1)	08:03	08:42 (11)	07:58	08:43 (8)	08:41
	21:58	65	07:37 (7)	21:13	07:36 (10)	20:05	19:14 (1)	18:57	11	08:53 (11)	16:58	09:03 (8)
14	05:41		06:33 (7)	06:26	07:07 (10)	07:16	18:20 (1)	08:05	08:44 (11)	07:59	08:45 (8)	08:42
	21:57	64	07:37 (7)	21:11	07:37 (10)	20:03	19:14 (1)	18:55	9	08:53 (11)	16:57	09:03 (8)
15	05:42		06:33 (7)	06:27	07:08 (10)	07:17	18:19 (1)	08:07	08:46 (11)	08:01	08:47 (8)	08:43
	21:56	64	07:37 (7)	21:09	07:37 (10)	20:01	19:13 (1)	18:52	7	08:53 (11)	16:55	09:03 (8)
16	05:44		06:33 (7)	06:29	07:10 (10)	07:19	18:19 (1)	08:08	08:48 (11)	08:03	08:49 (8)	08:44
	21:55	63	07:36 (7)	21:07	07:38 (10)	19:58	19:13 (1)	18:50	4	08:52 (11)	16:54	09:03 (8)
17	05:45		06:33 (7)	06:31	07:11 (10)	07:20	18:18 (1)	08:10	08:50 (11)	08:04	08:51 (8)	08:45
	21:54	63	07:36 (7)	21:05	07:37 (10)	19:56	19:12 (1)	18:48	2	08:52 (11)	16:53	09:03 (8)
18	05:46		06:35 (7)	06:32	07:13 (10)	07:22	18:18 (1)	08:12		08:06	08:53 (8)	08:46
	21:53	62	07:37 (7)	21:03	07:38 (10)	19:54	19:12 (1)	18:46		16:51	09:03 (8)	16:35
19	05:47		06:35 (7)	06:34	07:14 (10)	07:24	18:19 (1)	08:13		08:08	08:55 (8)	08:46
	21:52	62	07:37 (7)	21:01	07:37 (10)	19:51	19:12 (1)	18:44		16:50	09:03 (8)	16:35
20	05:49		06:35 (7)	06:35	07:16 (10)	07:25	18:18 (1)	08:15		08:10	09:03 (8)	16:37
	21:51	61	07:36 (7)	20:58	07:37 (10)	19:49	19:09 (1)	18:42		16:49	09:03 (8)	16:35
21	05:50		06:35 (7)	06:37	07:17 (10)	07:27	18:18 (1)	08:17		08:11	09:03 (8)	16:37
	21:50	61	07:36 (7)	20:56	07:36 (10)	19:47	19:07 (1)	18:40		16:48	09:03 (8)	16:36
22	05:51		06:35 (7)	06:39	07:19 (10)	07:28	18:18 (1)	08:19	09:43 (8)	08:13	09:13 (9)	16:38
	21:49	60	07:35 (7)	20:54	07:36 (10)	19:44	19:04 (1)	18:38	2	09:45 (8)	16:46	09:03 (8)
23	05:53		06:36 (7)	06:40	07:20 (10)	07:30	18:19 (1)	08:20	09:37 (8)	08:15	09:11 (9)	16:39
	21:47	59	07:35 (7)	20:52	07:35 (10)	19:42	19:02 (1)	18:36	14	09:51 (8)	16:45	09:03 (8)
24	05:54		06:38 (7)	06:42	07:22 (10)	07:32	18:20 (1)	08:22	09:34 (8)	08:16	09:10 (9)	16:39
	21:46	57	07:35 (7)	20:50	07:34 (10)	19:40	19:00 (1)	18:34	20	09:54 (8)	16:44	09:03 (8)
25	05:55		06:39 (7)	06:43	07:23 (10)	07:33	18:20 (1)	07:24		08:32 (8)	08:18	09:03 (8)
	21:45	56	07:35 (7)	20:48	07:33 (10)	19:37	18:57 (1)	17:32	24	08:56 (8)	16:43	09:03 (8)
26	05:57		06:40 (7)	06:45	07:25 (10)	07:35	18:21 (1)	07:26		08:30 (8)	08:19	09:03 (8)
	21:43	54	07:34 (7)	20:46	07:32 (10)	19:35	18:55 (1)	17:30	28	08:58 (8)	16:42	09:03 (8)
27	05:58		06:42 (7)	06:47	07:26 (10)	07:37	18:21 (1)	07:27		08:10 (14)	08:21	09:03 (8)
	21:42	52	07:34 (7)	20:44	07:30 (10)	19:33	18:52 (1)	17:28	35	08:59 (8)	16:41	09:03 (8)
28	06:00		06:43 (7)	06:48	18:52 (1)	07:38	18:23 (1)	07:29		08:11 (14)	08:22	09:03 (8)
	21:40	50	07:33 (7)	20:41	18:56 (1)	19:31	18:50 (1)	17:26	39	09:00 (8)	16:41	09:03 (8)
29	06:01		06:44 (7)	06:50	18:44 (1)	07:40	18:25 (1)	07:31		08:13 (14)	08:24	09:03 (8)
	21:39	48	07:32 (7)	20:39	19:02 (1)	19:28	18:48 (1)	17:24	40	09:01 (8)	16:40	09:03 (8)
30	06:03		06:46 (7)	06:51	18:41 (1)	07:41	18:26 (1)	07:33		08:15 (14)	08:25	09:03 (8)
	21:37	46	07:32 (7)	20:37	19:05 (1)	19:26	18:45 (1)	17:22	40	09:01 (8)	16:39	09:03 (8)
31	06:04		06:47 (7)	06:53	18:38 (1)			07:35		08:17 (14)		08:51
	21:36	43	07:30 (7)	20:35	19:07 (1)			17:20	40	09:02 (8)		16:43
Potential sun hours	501		453		381		332		267		245	
Total, worst case	1874		783		1342		440		1263		2637	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97	
Wind dir. red.	0,66		0,63		0,62		0,56		0,63		0,66	
Total reduction	0,26		0,26		0,22		0,17		0,14		0,10	
Total, real	479		204		290		74		171		276	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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17-03-2014 15:07 / 3

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (32)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:44 (6)	08:24		07:31	08:34 (5)	07:21	07:57 (8)	06:17	09:32 (5)	05:32
	16:44	115	14:09 (3)	17:31		18:23	17:41 (2)	20:16	11:03 (5)	21:06	10:07 (5)	21:52
2	08:50		09:44 (6)	08:23		07:29	08:33 (5)	07:19	07:54 (8)	06:15	09:35 (5)	05:32
	16:45	115	14:09 (3)	17:33		18:24	17:42 (2)	20:18	11:02 (5)	21:08	10:03 (5)	21:53
3	08:50		09:45 (6)	08:21		09:02 (12)	08:32 (5)	07:17	07:52 (11)	06:13	09:40 (5)	05:31
	16:46	114	14:10 (3)	17:35	2	09:03 (12)	17:43 (2)	20:19	11:01 (5)	21:10	09:58 (5)	21:54
4	08:50		09:45 (6)	08:19		09:00 (12)	08:29 (5)	07:14	07:50 (11)	06:11		05:30
	16:47	114	14:10 (3)	17:37	3	09:03 (12)	17:42 (2)	20:21	11:00 (5)	21:11		21:55
5	08:50		09:46 (6)	08:18		08:59 (12)	08:28 (5)	07:12	07:48 (11)	06:10		05:29
	16:49	114	14:11 (3)	17:39	4	09:03 (12)	17:43 (2)	20:23	10:59 (5)	21:13	2	06:13 (10)
6	08:50		09:46 (6)	08:16		08:57 (12)	08:27 (5)	07:10	07:45 (11)	06:08		05:29
	16:50	113	14:10 (3)	17:41	5	09:02 (12)	17:43 (2)	20:24	10:57 (5)	21:14	2	06:15 (10)
7	08:49		09:46 (6)	08:14		08:55 (12)	07:54 (14)	07:08	07:43 (11)	06:06		05:28
	16:51	113	14:10 (3)	17:42	6	09:01 (12)	17:43 (2)	20:26	10:56 (5)	21:16	3	06:16 (10)
8	08:49		09:47 (6)	08:13		08:53 (12)	07:52 (14)	07:05	07:42 (11)	06:04		05:28
	16:52	113	14:11 (3)	17:44	6	08:59 (12)	17:43 (2)	20:28	10:55 (5)	21:18	4	06:16 (10)
9	08:48		09:47 (6)	08:11		07:14	07:50 (14)	07:03	07:44 (11)	06:03		05:27
	16:54	112	14:11 (3)	17:46		18:37	17:43 (2)	20:29	10:54 (5)	21:19	5	06:17 (10)
10	08:48		09:47 (6)	08:09		07:12	07:48 (14)	07:01	07:49 (11)	06:01		05:27
	16:55	112	14:11 (3)	17:48		18:38	17:43 (2)	20:31	10:53 (5)	21:21	5	06:16 (10)
11	08:47		09:48 (6)	08:07		07:09	07:45 (14)	06:59	07:59 (8)	05:59		05:26
	16:56	111	14:11 (3)	17:50		18:40	17:42 (2)	20:33	10:52 (5)	21:23	6	06:17 (10)
12	08:47		09:49 (6)	08:06		08:45 (9)	07:43 (14)	06:57	08:00 (8)	05:58		05:26
	16:58	110	14:12 (3)	17:52	2	08:47 (9)	17:42 (2)	20:34	10:49 (5)	21:24	6	06:17 (10)
13	08:46		09:50 (6)	08:04		08:43 (9)	07:45 (14)	06:54	08:02 (8)	05:56		05:26
	16:59	109	14:12 (3)	17:54	5	08:48 (9)	17:42 (2)	20:36	10:48 (5)	21:26	7	06:18 (10)
14	08:45		09:50 (6)	08:02		08:41 (9)	08:19 (5)	06:52	08:05 (8)	05:54		05:26
	17:01	108	14:12 (3)	17:55	8	08:49 (9)	17:41 (2)	20:38	10:46 (5)	21:27	7	06:18 (10)
15	08:44		09:50 (6)	08:00		08:39 (9)	08:18 (5)	06:50	09:12 (5)	05:53		05:25
	17:02	106	14:11 (3)	17:57	11	08:50 (9)	17:41 (2)	20:40	10:45 (5)	21:29	7	06:18 (10)
16	08:44		09:50 (6)	07:58		08:37 (9)	08:18 (5)	06:48	09:13 (5)	05:51		05:25
	17:04	106	14:11 (3)	17:59	13	08:50 (9)	17:40 (2)	20:41	10:43 (5)	21:30	8	06:19 (10)
17	08:43		09:51 (6)	07:56		08:35 (9)	08:16 (5)	06:46	09:14 (5)	05:50		05:25
	17:06	104	14:11 (3)	18:01	40	17:18 (2)	17:39 (2)	20:43	10:41 (5)	21:32	8	06:19 (10)
18	08:42		09:52 (6)	07:54		08:32 (9)	08:16 (5)	06:44	09:14 (5)	05:48		05:25
	17:07	101	14:10 (3)	18:03	67	17:21 (2)	17:38 (2)	20:45	10:39 (5)	21:33	8	06:19 (10)
19	08:41		09:53 (6)	07:52		08:30 (9)	08:16 (5)	06:41	09:15 (5)	05:47		05:25
	17:09	98	14:10 (3)	18:05	83	17:23 (2)	17:38 (2)	20:46	10:38 (5)	21:35	8	06:19 (10)
20	08:40		09:53 (6)	07:50		08:28 (9)	07:24 (8)	06:39	09:16 (5)	05:46		05:25
	17:10	96	14:09 (3)	18:06	96	17:25 (2)	17:36 (2)	20:48	10:36 (5)	21:36	8	06:19 (10)
21	08:39		09:54 (6)	07:48		08:26 (9)	07:22 (8)	06:37	09:17 (5)	05:44		05:25
	17:12	94	14:09 (3)	18:08	109	17:27 (2)	17:35 (2)	20:50	10:34 (5)	21:38	8	06:19 (10)
22	08:38		09:55 (6)	07:46		08:24 (9)	07:20 (8)	06:35	09:18 (5)	05:43		05:26
	17:14	92	14:09 (3)	18:10	120	17:30 (2)	17:34 (2)	20:51	10:31 (5)	21:39	8	06:19 (10)
23	08:36		09:56 (6)	07:44		08:23 (9)	07:17 (8)	06:33	09:19 (5)	05:42		05:26
	17:16	87	14:07 (3)	18:12	128	17:32 (2)	17:32 (2)	20:53	10:29 (5)	21:40	8	06:20 (10)
24	08:35		09:57 (6)	07:42		08:23 (9)	07:15 (8)	06:31	09:20 (5)	05:41		05:26
	17:17	84	14:07 (3)	18:14	132	17:33 (2)	17:30 (2)	20:55	10:27 (5)	21:42	8	06:20 (10)
25	08:34		09:58 (6)	07:40		08:24 (9)	07:13 (8)	06:29	09:21 (5)	05:39		05:26
	17:19	77	14:05 (3)	18:15	136	17:35 (2)	17:29 (2)	20:56	10:24 (5)	21:43	8	06:20 (10)
26	08:33		09:59 (6)	07:38		08:26 (9)	07:10 (8)	06:27	09:22 (5)	05:38		05:27
	17:21	74	14:05 (3)	18:17	139	17:37 (2)	17:26 (2)	20:58	10:22 (5)	21:44	8	06:21 (10)
27	08:31		10:00 (6)	07:36		08:28 (9)	07:08 (8)	06:25	09:23 (5)	05:37		05:27
	17:22	68	14:03 (3)	18:19	142	17:39 (2)	17:24 (2)	21:00	10:19 (5)	21:46	8	06:21 (10)
28	08:30		10:03 (6)	07:33		08:35 (5)	07:06 (8)	06:23	09:25 (5)	05:36		05:28
	17:24	59	14:01 (3)	18:21	139	17:40 (2)	17:21 (2)	21:01	10:16 (5)	21:47	7	06:21 (10)
29	08:29		10:04 (6)			07:28	08:04 (8)	06:21	09:28 (5)	05:35		05:28
	17:26	51	13:59 (3)			20:11	18:18 (2)	21:03	10:14 (5)	21:48	7	06:21 (10)
30	08:27		10:06 (6)			07:26	08:01 (8)	06:19	09:29 (5)	05:34		05:29
	17:28	40	13:55 (3)			20:13	18:09 (2)	21:05	10:11 (5)	21:49	6	06:21 (10)
31	08:26		10:10 (6)			07:24	07:59 (8)		05:33			
	17:30	18	13:48 (3)			20:14	11:04 (5)		21:50			
Potential sun hours	260		278			367		415		484		497
Total, worst case	2928		1396			5249		3108		81		170
Sun reduction	0,18		0,27			0,30		0,38		0,43		0,38
Oper. time red.	0,97		0,97			0,97		0,97		0,97		0,97
Wind dir. red.	0,65		0,59			0,60		0,57		0,56		0,69
Total reduction	0,12		0,16			0,18		0,22		0,24		0,26
Total, real	347		221			928		671		19		44

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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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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17-03-2014 15:07 / 4

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Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:20/2.7.490

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SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (32)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December		
1	05:30	06:15 (10)	06:06		06:55	07:58 (8)	07:43	08:21 (14)	07:36		08:27	09:30 (6)	
	22:05	6 06:21 (10)	21:34		20:33	128 10:51 (5)	19:24	181 18:21 (2)	17:18		16:38	111 13:53 (3)	
2	05:30	06:16 (10)	06:07		06:56	07:46 (11)	07:45	08:23 (14)	07:38		08:28	09:31 (6)	
	22:05	5 06:21 (10)	21:32		20:30	135 10:51 (5)	19:21	179 18:21 (2)	17:16		16:38	112 13:54 (3)	
3	05:31	06:17 (10)	06:09		06:58	07:42 (11)	07:46	08:25 (14)	07:40	08:23 (12)	08:30	09:31 (6)	
	22:05	5 06:22 (10)	21:31		20:28	148 10:52 (5)	19:19	178 18:21 (2)	17:15	6 08:29 (12)	16:37	112 13:55 (3)	
4	05:32	06:17 (10)	06:10		07:00	07:39 (11)	07:48	08:26 (14)	07:42		08:25 (12)	08:31	09:31 (6)
	22:04	4 06:21 (10)	21:29		20:26	154 10:52 (5)	19:17	175 18:20 (2)	17:13	6 08:31 (12)	16:36	112 13:55 (3)	
5	05:32	06:18 (10)	06:12		07:01	07:40 (11)	07:50	08:28 (14)	07:43		08:27 (12)	08:32	09:32 (6)
	22:04	3 06:21 (10)	21:27		20:24	155 10:53 (5)	19:15	172 18:20 (2)	17:11	5 08:32 (12)	16:36	113 13:56 (3)	
6	05:33	06:19 (10)	06:13		07:03	07:41 (11)	07:51	08:30 (14)	07:45		08:29 (12)	08:34	09:32 (6)
	22:03	3 06:22 (10)	21:26		20:21	154 10:53 (5)	19:12	168 18:20 (2)	17:09	4 08:33 (12)	16:36	113 13:56 (3)	
7	05:34	06:20 (10)	06:15		07:04	07:43 (11)	07:53	08:32 (14)	07:47		08:31 (12)	08:35	09:32 (6)
	22:03	2 06:22 (10)	21:24		20:19	155 10:54 (5)	19:10	164 18:19 (2)	17:08	3 08:34 (12)	16:35	114 13:57 (3)	
8	05:35	06:21 (10)	06:16		07:06	07:44 (11)	07:55	09:03 (5)	07:49		08:33 (12)	08:36	09:33 (6)
	22:02	2 06:22 (10)	21:22		20:17	155 10:54 (5)	19:08	160 18:18 (2)	17:06	2 08:34 (12)	16:35	114 13:58 (3)	
9	05:36		06:18		07:08	07:46 (11)	07:56	09:04 (5)	07:51		08:37	09:33 (6)	
	22:01		21:20	3 09:59 (5)	20:14	154 10:55 (5)	19:06	157 18:18 (2)	17:04		16:35	114 13:58 (3)	
10	05:37		06:19		09:47 (5)	07:09	07:58	09:05 (5)	07:52	09:46 (6)	08:38	09:34 (6)	
	22:01		21:18	21 10:08 (5)	20:12	153 10:55 (5)	19:03	153 18:17 (2)	17:03	3 09:49 (6)	16:34	115 13:59 (3)	
11	05:38		06:21		09:42 (5)	07:11	08:00	09:06 (5)	07:54		09:40 (6)	08:39	09:34 (6)
	22:00		21:16	30 10:12 (5)	20:10	153 10:56 (5)	19:01	150 18:16 (2)	17:01	21 13:20 (3)	16:34	115 13:59 (3)	
12	05:39		06:23		09:40 (5)	07:12	08:01	09:06 (5)	07:56		09:38 (6)	08:40	09:35 (6)
	21:59		21:14	37 10:17 (5)	20:08	151 10:56 (5)	18:59	147 18:15 (2)	17:00	40 13:27 (3)	16:34	115 14:00 (3)	
13	05:40		06:24		09:36 (5)	07:14	08:03	09:08 (5)	07:58		09:36 (6)	08:41	09:36 (6)
	21:58		21:13	43 10:19 (5)	20:05	150 10:56 (5)	18:57	141 18:14 (2)	16:58	52 13:31 (3)	16:34	115 14:01 (3)	
14	05:41		06:26		09:35 (5)	07:16	08:05	09:03 (9)	07:59		09:34 (6)	08:42	09:36 (6)
	21:57		21:11	48 10:23 (5)	20:03	166 18:07 (2)	18:55	144 18:13 (2)	16:57	60 13:33 (3)	16:34	115 14:01 (3)	
15	05:42		06:27		09:32 (5)	07:17	08:07	08:59 (9)	08:01		09:33 (6)	08:43	09:37 (6)
	21:56		21:09	53 10:25 (5)	20:01	173 18:10 (2)	18:52	143 18:11 (2)	16:55	68 13:36 (3)	16:34	115 14:02 (3)	
16	05:44		06:29		09:31 (5)	07:19	08:08	08:57 (9)	08:03		09:32 (6)	08:44	09:36 (6)
	21:55		21:07	56 10:27 (5)	19:58	177 18:13 (2)	18:50	140 18:09 (2)	16:54	74 13:38 (3)	16:34	116 14:02 (3)	
17	05:45		06:31		09:28 (5)	07:20	08:10	08:56 (9)	08:04		09:32 (6)	08:45	09:37 (6)
	21:54		21:05	61 10:29 (5)	19:56	178 18:14 (2)	18:48	136 18:07 (2)	16:53	78 13:39 (3)	16:34	116 14:02 (3)	
18	05:46		06:32		09:27 (5)	07:22	08:12	08:54 (9)	08:06		09:31 (6)	08:46	09:38 (6)
	21:53		21:03	65 10:32 (5)	19:54	180 18:16 (2)	18:46	130 18:03 (2)	16:51	84 13:41 (3)	16:35	115 14:03 (3)	
19	05:47		06:34		09:25 (5)	07:24	08:13	08:53 (9)	08:08		09:31 (6)	08:46	09:38 (6)
	21:52		21:01	68 10:33 (5)	19:51	180 18:17 (2)	18:44	125 18:01 (2)	16:50	87 13:42 (3)	16:35	116 14:04 (3)	
20	05:49		06:35		09:24 (5)	07:25	08:15	08:55 (9)	08:10		09:30 (6)	08:47	09:38 (6)
	21:51		20:58	71 10:35 (5)	19:49	181 18:18 (2)	18:42	116 17:59 (2)	16:49	91 13:44 (3)	16:35	116 14:04 (3)	
21	05:50		06:37		09:22 (5)	07:27	08:17	08:57 (9)	08:11		09:30 (6)	08:48	09:39 (6)
	21:50		20:56	74 10:36 (5)	19:47	180 18:19 (2)	18:40	106 17:57 (2)	16:48	94 13:45 (3)	16:36	117 14:05 (3)	
22	05:51		06:39		09:21 (5)	07:28	08:19	08:59 (9)	08:13		09:29 (6)	08:48	09:39 (6)
	21:49		20:54	78 10:39 (5)	19:44	177 18:19 (2)	18:38	94 17:55 (2)	16:46	96 13:45 (3)	16:36	117 14:05 (3)	
23	05:53		06:40		09:20 (5)	07:30	08:20	09:01 (9)	08:14		09:29 (6)	08:49	09:40 (6)
	21:47		20:52	80 10:40 (5)	19:42	174 18:20 (2)	18:36	79 17:53 (2)	16:45	98 13:46 (3)	16:37	116 14:06 (3)	
24	05:54		06:42		09:19 (5)	07:32	08:22	09:03 (9)	08:16		09:29 (6)	08:49	09:40 (6)
	21:46		20:50	83 10:42 (5)	19:40	171 18:21 (2)	18:34	61 17:51 (2)	16:44	101 13:48 (3)	16:37	116 14:06 (3)	
25	05:55		06:43		09:17 (5)	07:33	08:24	08:05 (9)	08:18		09:29 (6)	08:49	09:41 (6)
	21:45		20:48	85 10:42 (5)	19:37	173 18:21 (2)	17:32	26 08:53 (5)	16:43	104 13:49 (3)	16:38	115 14:06 (3)	
26	05:57		06:45		09:16 (5)	07:35	08:26	08:07 (9)	08:19		09:30 (6)	08:50	09:41 (6)
	21:43		20:46	88 10:44 (5)	19:35	172 18:21 (2)	17:30	12 08:19 (9)	16:42	105 13:50 (3)	16:39	115 14:06 (3)	
27	05:58		06:47		09:15 (5)	07:37	08:27	08:09 (9)	08:21		09:30 (6)	08:50	09:42 (6)
	21:42		20:44	90 10:45 (5)	19:33	174 18:21 (2)	17:28	10 08:19 (9)	16:41	106 13:51 (3)	16:39	115 14:07 (3)	
28	06:00		06:48		09:14 (5)	07:38	08:29	08:11 (9)	08:22		09:29 (6)	08:50	09:42 (6)
	21:40		20:41	93 10:47 (5)	19:31	173 18:21 (2)	17:26	7 08:18 (9)	16:41	108 13:51 (3)	16:40	116 14:08 (3)	
29	06:01		06:50		08:06 (8)	07:40	07:31	08:13 (9)	08:24		09:30 (6)	08:50	09:43 (6)
	21:39		20:39	106 10:47 (5)	19:28	174 18:22 (2)	17:24	5 08:18 (9)	16:40	109 13:52 (3)	16:41	115 14:08 (3)	
30	06:03		06:52		08:03 (8)	07:41	07:33	08:15 (9)	08:25		09:30 (6)	08:51	09:43 (6)
	21:37		20:37	116 10:49 (5)	19:26	173 18:21 (2)	17:22	2 08:17 (9)	16:39	110 13:53 (3)	16:42	116 14:09 (3)	
31	06:04		06:53		07:59 (8)		07:35				08:51	09:43 (6)	
	21:36		20:35	122 10:49 (5)			17:20				16:43	115 14:08 (3)	
Potential sun hours	501		453		381		332		267		245		
Total, worst case		30		1571		4921		3461		1715		3557	
Sun reduction		0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.		0,97		0,97		0,97		0,97		0,97		0,97	
Wind dir. red.		0,69		0,57		0,59		0,60		0,65		0,65	
Total reduction		0,27		0,24		0,21		0,18		0,14		0,11	
Total, real		8		370		1021		624		241		374	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:20/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (33)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:50		11:41 (29)	08:24		09:06 (32)	07:31		17:42 (11)	07:21		19:16 (16)	06:17		06:57 (30)	05:32		06:47 (30)
	16:44	66	15:51 (24)	17:31	59	16:18 (24)	18:22	2	17:43 (11)	20:16	21	19:37 (16)	21:06	103	20:24 (21)	21:51	98	21:05 (19)
2	08:50		11:42 (29)	08:23		09:04 (32)	07:29		17:43 (11)	07:19		19:16 (16)	06:15		06:56 (30)	05:31		06:47 (30)
	16:45	65	15:52 (24)	17:33	61	16:18 (24)	18:24	2	17:45 (11)	20:18	19	19:35 (16)	21:08	107	20:26 (21)	21:53	98	21:05 (19)
3	08:50		11:42 (29)	08:21		09:02 (32)	07:27		17:44 (11)	07:17		19:18 (16)	06:13		06:54 (30)	05:31		06:47 (30)
	16:46	67	15:53 (24)	17:35	63	16:50 (14)	18:26	3	17:47 (11)	20:19	15	19:33 (16)	21:09	111	20:27 (21)	21:54	99	21:06 (19)
4	08:50		11:43 (29)	08:19		09:00 (32)	07:25		17:45 (11)	07:14		19:21 (16)	06:11		06:54 (30)	05:30		06:48 (30)
	16:47	67	15:55 (24)	17:37	64	16:52 (14)	18:28	3	17:48 (11)	20:21	8	19:29 (16)	21:11	112	20:27 (21)	21:55	99	21:07 (19)
5	08:50		11:45 (29)	08:18		08:58 (32)	07:22		17:49 (11)	07:12			06:10		06:53 (30)	05:29		06:47 (30)
	16:48	66	15:56 (24)	17:39	65	16:54 (14)	18:30	2	17:50 (11)	20:23			21:13	114	20:27 (21)	21:56	101	21:08 (19)
6	08:49		11:45 (29)	08:16		08:57 (32)	07:20			07:10			06:08		06:52 (30)	05:29		06:48 (30)
	16:50	67	15:57 (24)	17:40	65	16:57 (14)	18:31			20:24			21:14	114	20:26 (21)	21:57	101	21:09 (19)
7	08:49		11:46 (29)	08:14		08:55 (32)	07:18			07:08			06:06		06:51 (30)	05:28		06:48 (30)
	16:51	66	15:58 (24)	17:42	63	16:59 (14)	18:33			20:26			21:16	117	20:27 (21)	21:57	100	21:09 (19)
8	08:49		11:48 (29)	08:13		08:53 (32)	07:16			07:05			06:04		06:50 (30)	05:28		06:48 (30)
	16:52	67	16:01 (24)	17:44	54	16:09 (24)	18:35			20:28			21:18	117	20:26 (21)	21:58	101	21:10 (19)
9	08:48		11:49 (29)	08:11		08:52 (32)	07:14			07:03			06:02		06:50 (30)	05:27		06:49 (30)
	16:54	67	16:02 (24)	17:46	47	16:05 (24)	18:37			20:29			21:19	117	20:26 (21)	21:59	101	21:11 (19)
10	08:48		11:50 (29)	08:09		08:52 (32)	07:11			07:01			06:01		06:49 (30)	05:27		06:48 (30)
	16:55	66	16:03 (24)	17:48	38	09:30 (32)	18:38			20:31			21:21	117	20:25 (21)	22:00	101	21:11 (19)
11	08:47		11:51 (29)	08:07		08:52 (32)	07:09			06:59			05:59		06:49 (30)	05:26		06:49 (30)
	16:56	66	16:05 (24)	17:50	39	17:07 (18)	18:40			20:33			21:22	117	20:25 (21)	22:01	101	21:12 (19)
12	08:46		11:53 (29)	08:05		08:53 (32)	07:07			06:56			05:57		06:48 (30)	05:26		06:49 (30)
	16:58	64	16:06 (24)	17:52	41	17:09 (18)	18:42			20:34			21:24	117	20:24 (21)	22:01	102	21:13 (19)
13	08:46		11:55 (29)	08:04		08:53 (32)	07:05			06:54			05:56		06:48 (30)	05:26		06:50 (30)
	16:59	63	16:08 (24)	17:53	42	17:11 (18)	18:44			20:36			21:26	117	20:24 (21)	22:02	101	21:14 (19)
14	08:45		11:57 (29)	08:02		08:54 (32)	07:02			06:52			05:54		06:47 (30)	05:25		06:50 (30)
	17:01	60	16:10 (24)	17:55	43	17:13 (18)	18:45			20:38			21:27	116	20:23 (21)	22:03	102	21:14 (19)
15	08:44		11:59 (29)	08:00		08:55 (32)	07:00			06:50			05:53		06:47 (30)	05:25		06:50 (30)
	17:02	58	16:12 (24)	17:57	43	17:15 (18)	18:47			20:39			21:29	116	20:23 (21)	22:03	102	21:15 (19)
16	08:43		12:03 (29)	07:58		08:56 (32)	06:58			06:48			05:51		06:47 (30)	05:25		06:50 (30)
	17:04	53	16:14 (24)	17:59	44	17:18 (18)	18:49			20:41			21:30	116	20:23 (21)	22:04	102	21:15 (19)
17	08:43		15:32 (24)	07:56		08:56 (32)	06:56			06:46		20:00 (21)	05:50		06:46 (30)	05:25		06:50 (30)
	17:05	44	16:16 (24)	18:01	44	17:19 (18)	18:50			20:43	3	20:03 (21)	21:32	114	20:21 (21)	22:04	102	21:15 (19)
18	08:42		15:33 (24)	07:54		08:58 (32)	06:53			06:43		19:56 (21)	05:48		06:46 (30)	05:25		06:51 (30)
	17:07	45	16:18 (24)	18:03	41	17:21 (18)	18:52			20:44	9	20:05 (21)	21:33	114	20:21 (21)	22:05	102	21:16 (19)
19	08:41		15:33 (24)	07:52		09:00 (32)	06:51			06:41		19:54 (21)	05:47		06:46 (30)	05:25		06:51 (30)
	17:09	45	16:18 (24)	18:04	39	17:23 (18)	18:54			20:46	12	20:06 (13)	21:35	115	20:50 (19)	22:05	102	21:16 (19)
20	08:40		15:33 (24)	07:50		09:02 (32)	06:49			06:39		19:52 (21)	05:46		06:46 (30)	05:25		06:51 (30)
	17:10	45	16:18 (24)	18:06	36	17:25 (18)	18:56			20:48	16	20:08 (13)	21:36	114	20:51 (19)	22:05	102	21:16 (19)
21	08:39		15:34 (24)	07:48		09:08 (32)	06:46			06:37		19:50 (21)	05:44		06:47 (30)	05:25		06:51 (30)
	17:12	45	16:19 (24)	18:08	24	17:26 (18)	18:57			20:50	19	20:09 (13)	21:37	112	20:52 (19)	22:06	102	21:16 (19)
22	08:37		15:34 (24)	07:46		17:08 (18)	06:44		18:18 (16)	06:35		07:19 (30)	05:43		06:46 (30)	05:25		06:51 (30)
	17:14	45	16:19 (24)	18:10	17	17:25 (18)	18:59	3	18:21 (16)	20:51	43	20:11 (13)	21:39	112	20:53 (19)	22:06	102	21:16 (19)
23	08:36		15:34 (24)	07:44		17:09 (18)	06:42		18:16 (16)	06:33		07:14 (30)	05:42		06:46 (30)	05:26		06:52 (30)
	17:15	45	16:19 (24)	18:12	13	17:22 (18)	19:01	6	18:22 (16)	20:53	54	20:12 (13)	21:40	111	20:54 (19)	22:06	102	21:17 (19)
24	08:35		15:35 (24)	07:42		17:14 (18)	06:40		18:15 (16)	06:31		07:11 (30)	05:40		06:46 (30)	05:26		06:52 (30)
	17:17	45	16:20 (24)	18:13	3	17:17 (18)	19:02	9	18:24 (16)	20:55	63	20:14 (13)	21:42	110	20:55 (19)	22:06	101	21:17 (19)
25	08:34		09:17 (32)	07:40			06:37		18:15 (16)	06:29		07:08 (30)	05:39		06:46 (30)	05:26		06:52 (30)
	17:19	46	16:19 (24)	18:15			19:04	11	18:26 (16)	20:56	71	20:15 (13)	21:43	107	20:56 (19)	22:06	102	21:17 (19)
26	08:33		09:16 (32)	07:38			06:35		18:14 (16)	06:27		07:06 (30)	05:38		06:46 (30)	05:27		06:53 (30)
	17:21	49	16:20 (24)	18:17			19:06	13	18:27 (16)	20:58	78	20:17 (13)	21:44	102	20:57 (19)	22:06	102	21:18 (19)
27	08:31		09:14 (32)	07:35			06:33		18:14 (16)	06:25		07:03 (30)	05:37		06:47 (30)	05:27		06:53 (30)
	17:22	51	16:19 (24)	18:19			19:07	15	18:29 (16)	21:00	84	20:18 (13)	21:45	93	20:59 (19)	22:06	101	21:17 (19)
28	08:30		09:12 (32)	07:33			06:30		18:14 (16)	06:23		07:01 (30)	05:36		06:47 (30)	05:28		06:52 (30)
	17:24	54	16:19 (24)	18:21			19:09	17	18:31 (16)	21:01	91	20:20 (21)	21:47	94	21:00 (19)	22:06	103	21:17 (19)
29	08:28		09:11 (32)				07:28		19:13 (16)	06:21		07:00 (30)	05:35		06:46 (30)	05:28		06:53 (30)
	17:26	56	16:19 (24)				20:11	19	19:32 (16)	21:03	94	20:21 (21)	21:48	96	21:01 (19)	22:06	102	21:17 (19)
30	08:27		09:09 (32)				07:26		19:14 (16)	06:19		06:59 (30)	05:34		06:46 (30)	05:29		06:54 (30)
	17:28	57	16:19 (24)				20:12	20	19:34 (16)	21:05	99	20:23 (21)	21:49	97	21:02 (19)	22:06	101	21:17 (19)
31	08:26		09:07 (32)				07:23		19:15 (16)				05:33		06:46 (30)			
	17:30	59	16:18 (24)				20:14	21	19:36 (16)				21:50	98	21:03 (19)			
Potential sun hours	260			278			367			416			484			497		
Total, worst case		1759		1048			146			799			3417			3035		
Sun reduction		0,18		0,27			0,30			0,38			0,43			0,38		
Oper. time red.		0,97		0,97			0,97			0,97			0,97			0,97		
Wind dir. red.		0,68		0,62			0,61			0,59			0,61			0,62		
Total reduction		0,12		0,16			0,18			0,22			0,26			0,23		
Total, real		218		172			27			179			874			704		

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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17-03-2014 15:07 / 6

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Witteveen+Bos

Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:20/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (33)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:53 (30)	06:05	06:59 (30)	06:55	07:43		07:36		08:21 (32)	08:27
	22:05	102	21:17 (19)	21:34	20:35 (21)	20:32	19:24		17:18	38	08:59 (32)	16:38
2	05:30		06:54 (30)	06:07	07:00 (30)	06:56	07:45		07:38		08:21 (32)	08:28
	22:05	102	21:17 (19)	21:32	20:36 (21)	20:30	19:21		17:16	49	15:36 (24)	16:38
3	05:31		06:53 (30)	06:08	07:00 (30)	06:58	07:46		07:40		08:23 (32)	08:29
	22:05	101	21:16 (19)	21:31	20:36 (21)	20:28	19:19		17:14	58	16:30 (14)	16:37
4	05:31		06:54 (30)	06:10	07:00 (30)	06:59	07:48		07:42		08:25 (32)	08:31
	22:04	101	21:16 (19)	21:29	20:36 (21)	20:26	19:17		17:13	64	16:28 (14)	16:36
5	05:32		06:54 (30)	06:12	07:01 (30)	07:01	07:50		07:43		08:27 (32)	08:32
	22:04	101	21:16 (19)	21:27	20:37 (21)	20:23	19:14		17:11	65	16:26 (14)	16:36
6	05:33		06:54 (30)	06:13	07:01 (30)	07:03	07:51		07:45		08:29 (32)	08:33
	22:03	101	21:15 (19)	21:25	20:36 (21)	20:21	19:12		17:09	63	16:24 (14)	16:35
7	05:34		06:55 (30)	06:15	07:02 (30)	07:04	07:53		07:47		08:31 (32)	08:35
	22:03	99	21:15 (19)	21:24	20:37 (21)	20:19	19:10		17:07	62	16:22 (14)	16:35
8	05:35		06:54 (30)	06:16	07:03 (30)	07:06	19:16 (16)	07:55	07:49		08:33 (32)	08:36
	22:02	100	21:14 (19)	21:22	20:37 (21)	20:17	19:23 (16)	19:08	17:06	63	16:20 (14)	16:35
9	05:36		06:54 (30)	06:18	07:03 (30)	07:07	19:12 (16)	07:56	18:22 (11)	07:50	08:35 (32)	08:37
	22:01	99	21:13 (19)	21:20	20:36 (21)	20:14	19:27 (16)	19:05	18:25 (11)	17:04	15:48 (24)	16:34
10	05:37		06:54 (30)	06:19	07:04 (30)	07:09	19:09 (16)	07:58	18:19 (11)	07:52	08:37 (32)	08:38
	22:01	99	21:13 (19)	21:18	20:36 (21)	20:12	19:28 (16)	19:03	18:22 (11)	17:03	15:49 (24)	16:34
11	05:38		06:55 (30)	06:21	07:05 (30)	07:11	19:08 (16)	08:00	18:17 (11)	07:54	08:39 (32)	08:39
	22:00	98	21:12 (19)	21:16	20:34 (21)	20:10	19:29 (16)	19:01	18:19 (11)	17:01	15:50 (24)	16:34
12	05:39		06:55 (30)	06:23	07:06 (30)	07:12	19:06 (16)	08:01	18:16 (11)	07:56	08:41 (32)	08:40
	21:59	98	21:12 (19)	21:14	20:33 (21)	20:07	19:27 (16)	18:59	18:17 (11)	16:59	15:51 (24)	16:34
13	05:40		06:55 (30)	06:24	07:07 (30)	07:14	19:05 (16)	08:03		07:57	08:43 (32)	08:41
	21:58	97	21:11 (19)	21:12	20:30 (21)	20:05	19:26 (16)	18:57		16:58	15:51 (24)	16:34
14	05:41		06:55 (30)	06:26	07:09 (30)	07:15	19:05 (16)	08:05		07:59	08:45 (32)	08:42
	21:57	96	21:10 (19)	21:10	20:29 (21)	20:03	19:24 (16)	18:54		16:57	15:52 (24)	16:34
15	05:42		06:55 (30)	06:27	07:09 (30)	07:17	19:03 (16)	08:06		08:01	08:47 (32)	08:43
	21:56	95	21:09 (19)	21:08	20:27 (21)	20:01	19:21 (16)	18:52		16:55	15:52 (24)	16:34
16	05:43		06:55 (30)	06:29	07:11 (30)	07:19	19:03 (16)	08:08		08:03	08:49 (32)	08:44
	21:55	94	21:08 (19)	21:07	20:25 (13)	19:58	19:19 (16)	18:50		16:54	15:53 (24)	16:34
17	05:45		06:55 (30)	06:30	07:13 (30)	07:20	19:02 (16)	08:10		08:04	08:51 (32)	08:45
	21:54	100	21:07 (19)	21:04	20:23 (13)	19:56	19:16 (16)	18:48		16:52	15:53 (24)	16:34
18	05:46		06:55 (30)	06:32	07:15 (30)	07:22	19:02 (16)	08:12		17:43 (18)	08:06	15:09 (24)
	21:53	105	21:06 (19)	21:02	20:22 (13)	19:54	19:14 (16)	18:46	8	17:51 (18)	16:51	15:54 (24)
19	05:47		06:56 (30)	06:34	07:17 (30)	07:23	19:02 (16)	08:13		17:40 (18)	08:08	15:09 (24)
	21:52	108	21:06 (19)	21:00	20:19 (13)	19:51	19:11 (16)	18:44	14	17:54 (18)	16:50	15:54 (24)
20	05:48		06:56 (30)	06:35	07:20 (30)	07:25	19:02 (16)	08:15		17:38 (18)	08:09	15:09 (24)
	21:51	111	21:05 (19)	20:58	20:17 (13)	19:49	19:09 (16)	18:42	18	17:56 (18)	16:49	15:54 (24)
21	05:50		06:56 (30)	06:37	07:24 (30)	07:27	19:03 (16)	08:17		09:36 (32)	08:11	15:09 (24)
	21:50	112	21:04 (19)	20:56	20:15 (13)	19:47	19:07 (16)	18:40	30	17:57 (18)	16:47	15:54 (24)
22	05:51		06:56 (30)	06:38	19:54 (21)	07:28	19:03 (16)	08:19		09:32 (32)	08:13	15:09 (24)
	21:48	113	21:03 (19)	20:54	20:13 (13)	19:44	19:04 (16)	18:38	37	17:55 (18)	16:46	15:54 (24)
23	05:52		06:56 (30)	06:40	19:56 (21)	07:30		08:20		09:29 (32)	08:14	15:09 (24)
	21:47	113	21:01 (19)	20:52	20:11 (13)	19:42		18:35	40	17:53 (18)	16:45	15:54 (24)
24	05:54		06:57 (30)	06:42	19:57 (21)	07:32		08:22		09:28 (32)	08:16	15:10 (24)
	21:46	114	21:01 (19)	20:50	20:09 (13)	19:40		18:33	42	17:51 (18)	16:44	15:55 (24)
25	05:55		06:57 (30)	06:43	20:00 (21)	07:33		07:24		08:26 (32)	08:18	15:10 (24)
	21:44	114	20:59 (19)	20:48	20:07 (21)	19:37		17:31	44	16:49 (18)	16:43	15:54 (24)
26	05:57		06:57 (30)	06:45	20:02 (21)	07:35		07:26		08:25 (32)	08:19	11:43 (29)
	21:43	113	20:31 (21)	20:46	20:05 (21)	19:35		17:29	45	16:47 (18)	16:42	15:53 (24)
27	05:58		06:57 (30)	06:47		07:36		07:27		08:24 (32)	08:21	11:40 (29)
	21:42	114	20:32 (21)	20:43		19:33		17:27	44	16:44 (18)	16:41	15:52 (24)
28	06:00		06:58 (30)	06:48		07:38		07:29		08:23 (32)	08:22	11:37 (29)
	21:40	115	20:33 (21)	20:41		19:30		17:26	43	16:42 (18)	16:40	15:50 (24)
29	06:01		06:58 (30)	06:50		07:40		07:31		08:23 (32)	08:24	11:36 (29)
	21:39	116	20:34 (21)	20:39		19:28		17:24	41	16:40 (18)	16:40	15:49 (24)
30	06:02		06:58 (30)	06:51		07:41		07:33		08:22 (32)	08:25	11:35 (29)
	21:37	117	20:34 (21)	20:37		19:26		17:22	41	16:38 (18)	16:39	15:48 (24)
31	06:04		06:59 (30)	06:53				07:34		08:22 (32)		08:50
	21:36	117	20:35 (21)	20:35				17:20	39	16:36 (18)		16:43
Potential sun hours	501		453		381		332		267		245	
Total, worst case	3265		2080		205		496		1608		2024	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97	
Wind dir. red.	0,61		0,60		0,61		0,61		0,67		0,67	
Total reduction	0,24		0,25		0,22		0,18		0,14		0,11	
Total, real	782		516		44		91		232		217	

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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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (34)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:50	08:24	12:30 (29)	07:31	11:57 (29)	07:21
	16:44	17:31	124	16:46 (20)	18:22	176
2	08:50	08:23	12:29 (29)	07:29	11:56 (29)	07:19
	16:45	17:33	127	16:48 (20)	18:24	179
3	08:50	08:21	12:27 (29)	07:27	11:55 (29)	07:17
	16:46	17:35	133	16:50 (20)	18:26	182
4	08:50	08:19	12:26 (29)	07:25	11:54 (29)	07:14
	16:47	17:37	132	16:49 (20)	18:28	182
5	08:50	08:18	12:24 (29)	07:22	11:53 (29)	07:12
	16:48	17:39	134	16:48 (20)	18:30	178
6	08:49	08:16	12:23 (29)	07:20	11:53 (29)	07:10
	16:50	17:41	131	16:46 (20)	18:31	179
7	08:49	08:14	12:22 (29)	07:18	11:51 (29)	07:08
	16:51	17:42	126	14:28 (29)	18:33	181
8	08:49	08:13	12:21 (29)	07:16	11:50 (29)	07:05
	16:52	17:44	128	14:29 (29)	18:35	182
9	08:48	08:11	12:19 (29)	07:14	11:50 (29)	07:03
	16:54	17:46	131	14:30 (29)	18:37	183
10	08:48	08:09	12:18 (29)	07:11	11:48 (29)	07:01
	16:55	17:48	134	14:32 (29)	18:38	184
11	08:47	08:07	12:17 (29)	07:09	11:48 (29)	06:59
	16:56	17:50	136	14:33 (29)	18:40	192
12	08:46	08:05	12:16 (29)	07:07	11:47 (29)	06:56
	16:58	17:52	138	14:34 (29)	18:42	200
13	08:46	08:04	12:14 (29)	07:05	11:46 (29)	06:54
	16:59	17:53	142	14:36 (29)	18:44	205
14	08:45	08:02	12:13 (29)	07:02	11:45 (29)	06:52
	17:01	17:55	144	14:37 (29)	18:45	211
15	08:44	13:09 (29)	08:00	12:12 (29)	07:00	11:45 (29)
	17:02	13:29 (29)	17:57	14:38 (29)	18:47	215
16	08:43	13:04 (29)	07:58	12:10 (29)	06:58	11:44 (29)
	17:04	13:35 (29)	17:59	14:38 (29)	18:49	218
17	08:43	13:00 (29)	07:56	12:09 (29)	06:56	07:31 (32)
	17:05	13:40 (29)	18:01	14:39 (29)	18:50	229
18	08:42	12:57 (29)	07:54	12:08 (29)	06:53	07:29 (32)
	17:07	13:44 (29)	18:03	14:40 (29)	18:52	240
19	08:41	12:55 (29)	07:52	12:07 (29)	06:51	07:26 (32)
	17:09	13:47 (29)	18:04	14:42 (29)	18:54	249
20	08:40	12:52 (29)	07:50	12:06 (29)	06:49	07:24 (32)
	17:10	13:50 (29)	18:06	14:43 (29)	18:56	257
21	08:39	12:50 (29)	07:48	12:05 (29)	06:46	07:22 (32)
	17:12	13:53 (29)	18:08	14:44 (29)	18:57	263
22	08:37	12:48 (29)	07:46	12:04 (29)	06:44	07:20 (32)
	17:14	13:56 (29)	18:10	14:45 (29)	18:59	271
23	08:36	12:45 (29)	07:44	12:02 (29)	06:42	07:17 (32)
	17:15	13:58 (29)	18:12	14:45 (29)	19:01	278
24	08:35	12:44 (29)	07:42	12:02 (29)	06:39	07:15 (32)
	17:17	16:30 (20)	18:13	14:46 (29)	19:02	283
25	08:34	12:41 (29)	07:40	12:01 (29)	06:37	07:13 (32)
	17:19	16:31 (20)	18:15	14:47 (29)	19:04	288
26	08:33	12:40 (29)	07:38	12:00 (29)	06:35	07:10 (32)
	17:21	16:34 (20)	18:17	14:47 (29)	19:06	293
27	08:31	12:38 (29)	07:35	11:59 (29)	06:33	07:08 (32)
	17:22	16:35 (20)	18:19	14:48 (29)	19:07	299
28	08:30	12:36 (29)	07:33	11:57 (29)	06:30	07:06 (32)
	17:24	16:37 (20)	18:21	17:41 (14)	19:09	298
29	08:28	12:35 (29)		07:28		08:03 (32)
	17:26	16:40 (20)		20:11	297	19:21 (18)
30	08:27	12:33 (29)		07:26		08:02 (32)
	17:28	16:41 (20)		20:12	298	19:21 (24)
31	08:26	12:31 (29)		07:23		08:01 (32)
	17:30	16:43 (20)		20:14	298	19:20 (24)
Potential sun hours	260	278	367	415	484	497
Total, worst case	1252	4091	7188	7078	1705	
Sun reduction	0,18	0,27	0,30	0,38	0,43	
Oper. time red.	0,97	0,97	0,97	0,97	0,97	
Wind dir. red.	0,70	0,70	0,68	0,68	0,69	
Total reduction	0,13	0,18	0,20	0,25	0,29	
Total, real	157	750	1437	1799	489	

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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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Witteveen+Bos

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Calculated:

21-11-2013 11:20/2.7.490

Bos
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SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (34)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December						
1	05:29		06:05	14:40 (29)	06:55	08:00 (32)	07:43	12:26 (29)	07:36	11:48 (29)	08:27						
	22:05		21:34	57	15:37 (29)	20:32	251	18:56 (24)	19:24	202	18:43 (24)	17:18	133	14:01 (29)	16:38		
2	05:30		06:07		14:35 (29)	06:56		07:58 (32)	07:45		12:26 (29)	07:38		11:49 (29)	08:28		
	22:05		21:32	64	15:39 (29)	20:30	264	19:01 (24)	19:21	196	18:41 (24)	17:16	131	14:00 (29)	16:38		
3	05:31		06:08		14:28 (29)	06:58		07:58 (32)	07:46		12:26 (29)	07:40		11:51 (29)	08:29		
	22:05		21:31	71	15:39 (29)	20:28	272	19:05 (24)	19:19	188	18:38 (24)	17:14	127	13:58 (29)	16:37		
4	05:32		06:10		14:20 (29)	06:59		07:56 (32)	07:48		12:27 (29)	07:42		11:52 (29)	08:31		
	22:04		21:29	80	15:40 (29)	20:26	278	19:06 (24)	19:17	183	15:30 (29)	17:13	125	13:57 (29)	16:36		
5	05:32		06:12		14:11 (29)	07:01		07:56 (32)	07:50		12:27 (29)	07:43		11:53 (29)	08:32		
	22:04		21:27	99	20:37 (16)	20:23	283	19:08 (24)	19:14	182	15:29 (29)	17:11	132	16:16 (20)	16:36		
6	05:33		06:13		13:56 (29)	07:03		07:55 (32)	07:51		12:28 (29)	07:45		11:55 (29)	08:33		
	22:03		21:25	118	20:38 (16)	20:21	286	19:08 (24)	19:12	181	15:29 (29)	17:09	133	16:19 (20)	16:35		
7	05:34		06:15		13:14 (29)	07:04		07:55 (32)	07:53		12:27 (29)	07:47		11:56 (29)	08:35		
	22:03		21:24	165	20:41 (16)	20:19	290	19:10 (24)	19:10	180	15:27 (29)	17:07	134	16:20 (20)	16:35		
8	05:35		06:16		13:04 (29)	07:06		07:54 (32)	07:55		12:28 (29)	07:49		11:58 (29)	08:36		
	22:02		21:22	176	20:39 (16)	20:17	293	19:10 (24)	19:08	179	15:27 (29)	17:06	131	16:20 (20)	16:35		
9	05:36		06:18		12:59 (29)	07:07		07:54 (32)	07:56		12:28 (29)	07:50		12:00 (29)	08:37		
	22:01		21:20	181	20:37 (16)	20:14	295	19:11 (24)	19:05	184	18:25 (14)	17:04	128	16:19 (20)	16:34		
10	05:37		06:19		12:56 (29)	07:09		07:53 (32)	07:58		12:29 (29)	07:52		12:01 (29)	08:38		
	22:01		21:18	184	20:36 (16)	20:12	295	19:11 (24)	19:03	182	18:22 (14)	17:03	123	16:17 (20)	16:34		
11	05:38		06:21		12:53 (29)	07:11		07:53 (32)	08:00		12:29 (29)	07:54		12:03 (29)	08:39		
	22:00		21:16	186	20:34 (16)	20:10	297	19:12 (24)	19:01	180	18:19 (14)	17:01	119	16:15 (20)	16:34		
12	05:39		06:23		12:51 (29)	07:12		07:53 (32)	08:01		12:29 (29)	07:56		12:05 (29)	08:40		
	21:59		21:14	188	20:33 (16)	20:07	297	19:11 (24)	18:59	179	18:17 (14)	16:59	113	16:13 (20)	16:34		
13	05:40		06:24		12:49 (29)	07:14		07:53 (32)	08:03		12:30 (29)	07:57		12:07 (29)	08:41		
	21:58		21:12	188	20:30 (16)	20:05	298	19:12 (24)	18:57	175	18:15 (14)	16:58	109	16:12 (20)	16:34		
14	05:41		06:26		12:47 (29)	07:15		07:54 (32)	08:05		12:31 (29)	07:59		12:09 (29)	08:42		
	21:57		21:10	190	20:29 (16)	20:03	297	19:12 (18)	18:54	172	18:13 (14)	16:57	103	16:10 (20)	16:34		
15	05:42		06:27		12:46 (29)	07:17		07:55 (32)	08:06		12:32 (29)	08:01		12:11 (29)	08:43		
	21:56		21:08	190	20:27 (16)	20:01	298	19:14 (18)	18:52	168	15:20 (29)	16:55	97	16:08 (20)	16:34		
16	05:43		06:29		12:45 (29)	07:19		07:57 (32)	08:08		12:32 (29)	08:03		12:13 (29)	08:44		
	21:55		21:06	189	20:25 (16)	19:58	299	19:19 (11)	18:50	167	15:19 (29)	16:54	93	16:07 (20)	16:34		
17	05:45		06:30		12:43 (29)	07:20		07:58 (32)	08:10		12:32 (29)	08:04		12:15 (29)	08:45		
	21:54		21:04	189	20:23 (16)	19:56	295	19:16 (11)	18:48	165	15:17 (29)	16:52	86	16:05 (20)	16:34		
18	05:46		21:04 (13)	06:32	12:42 (29)	07:22		08:00 (32)	08:12		12:33 (29)	08:06		12:18 (29)	08:46		
	21:53	2	21:06 (13)	21:02	189	20:22 (16)	19:54	290	19:14 (11)	18:46	164	15:17 (29)	16:51	80	16:04 (20)	16:35	
19	05:47		21:03 (13)	06:34	12:41 (29)	07:23		08:01 (32)	08:13		12:34 (29)	08:08		12:20 (29)	08:46		
	21:52	3	21:06 (13)	21:00	187	15:48 (29)	19:51	285	19:11 (11)	18:44	162	15:16 (29)	16:50	73	13:33 (29)	16:35	
20	05:48		21:01 (13)	06:35	12:39 (29)	07:25		08:03 (32)	08:15		12:35 (29)	08:09		12:23 (29)	08:47		
	21:51	4	21:05 (13)	20:58	189	15:48 (29)	19:49	278	19:09 (18)	18:42	160	15:15 (29)	16:49	68	13:31 (29)	16:35	
21	05:50		21:00 (13)	06:37	12:39 (29)	07:27		08:05 (32)	08:17		12:36 (29)	08:11		12:25 (29)	08:47		
	21:50	4	21:04 (13)	20:56	189	15:48 (29)	19:47	272	19:07 (18)	18:40	158	15:14 (29)	16:47	63	13:28 (29)	16:36	
22	05:51		20:59 (13)	06:38	08:19 (32)	07:28		08:06 (32)	08:19		12:37 (29)	08:13		12:28 (29)	08:48		
	21:48	4	21:03 (13)	20:54	202	15:48 (29)	19:44	267	19:04 (18)	18:38	156	15:13 (29)	16:46	58	13:26 (29)	16:36	
23	05:52		20:59 (13)	06:40	08:15 (32)	07:30		08:08 (32)	08:20		12:38 (29)	08:14		12:31 (29)	08:48		
	21:47	2	21:01 (13)	20:52	213	15:49 (29)	19:42	259	19:02 (18)	18:35	154	15:12 (29)	16:45	52	13:23 (29)	16:37	
24	05:54		20:59 (13)	06:42	08:11 (32)	07:32		08:09 (32)	08:22		12:39 (29)	08:16		12:34 (29)	08:49		
	21:46	2	21:01 (13)	20:50	219	15:48 (29)	19:40	251	18:59 (18)	18:33	152	15:11 (29)	16:44	47	13:21 (29)	16:37	
25	05:55		20:58 (13)	06:43	08:10 (32)	07:33		08:11 (32)	07:24		11:40 (29)	08:18		12:38 (29)	08:49		
	21:44	2	20:59 (13)	20:48	223	15:49 (29)	19:37	244	18:57 (18)	17:31	149	14:09 (29)	16:43	40	13:18 (29)	16:38	
26	05:57		20:57 (13)	06:45	08:07 (32)	07:35		08:13 (32)	07:26		11:41 (29)	08:19		12:43 (29)	08:50		
	21:43		20:46	228	15:48 (29)	19:35	233	18:55 (18)	17:29	147	14:08 (29)	16:42	31	13:14 (29)	16:38		
27	05:58		15:08 (29)	06:47	08:06 (32)	07:36		12:25 (29)	07:27		11:42 (29)	08:21		12:49 (29)	08:50		
	21:42	17	15:25 (29)	20:43	231	15:49 (29)	19:33	220	18:52 (24)	17:27	145	14:07 (29)	16:41	20	13:09 (29)	16:39	
28	06:00		15:02 (29)	06:48	08:04 (32)	07:38		12:26 (29)	07:29		11:43 (29)	08:22		12:50 (29)	08:50		
	21:40	28	15:30 (29)	20:41	235	15:48 (29)	19:30	216	18:50 (24)	17:26	143	14:06 (29)	16:40		16:40	3	15:47 (17)
29	06:01		14:56 (29)	06:50	08:03 (32)	07:40		12:26 (29)	07:31		11:44 (29)	08:24		12:50 (29)	08:50		15:46 (17)
	21:39	36	15:32 (29)	20:39	238	15:49 (29)	19:28	212	18:48 (24)	17:24	141	14:05 (29)	16:40		16:41	2	15:48 (17)
30	06:02		14:51 (29)	06:51	08:01 (32)	07:41		12:25 (29)	07:33		11:45 (29)	08:25		12:50 (29)	08:50		
	21:37	42	15:33 (29)	20:37	241	15:48 (29)	19:26	207	18:45 (24)	17:22	139	14:04 (29)	16:39		16:42		
31	06:04		14:46 (29)	06:53	08:00 (32)			07:34			11:47 (29)			12:50 (29)	08:50		
	21:35	50	15:36 (29)	20:35	243	15:48 (29)		17:20	135	14:02 (29)				16:43			
Potential sun hours	501		453		381		332			267			245				
Total, worst case	196		5542		8122		5168			2549			45				
Sun reduction	0,40		0,42		0,36		0,31			0,22			0,16				
Oper. time red.	0,97		0,97		0,97		0,97			0,97			0,97				
Wind dir. red.	0,68		0,69		0,67		0,70			0,70			0,71				
Total reduction	0,26		0,28		0,24		0,21			0,15			0,11				
Total, real	52		1566		1910		1072			381			5				

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
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Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (35)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51	08:24	07:31	07:21	07:57 (38)	06:17
	16:44	17:31	18:23	20:16	07:58 (38)	21:06
2	08:51	08:23	07:29	07:19	07:54 (38)	06:15
	16:45	17:33	18:24	20:18	07:57 (38)	21:08
3	08:50	08:21	07:27	07:17	07:52 (38)	06:13
	16:46	17:35	18:26	20:19	07:58 (38)	21:10
4	08:50	08:20	07:25	07:14	07:50 (35)	06:11
	16:47	17:37	18:28	20:21	07:58 (35)	21:11
5	08:50	08:18	07:23	07:12	07:48 (35)	06:10
	16:49	17:39	18:30	20:23	08:02 (35)	21:13
6	08:50	08:16	07:20	07:10	07:45 (35)	06:08
	16:50	17:41	18:31	20:24	08:04 (35)	21:15
7	08:49	08:15	07:18	07:08	07:43 (35)	06:06
	16:51	17:42	18:33	20:26	08:06 (35)	21:16
8	08:49	08:13	07:16	07:05	07:41 (35)	06:04
	16:52	17:44	18:35	20:28	08:07 (35)	21:18
9	08:48	08:11	07:14	07:03	07:39 (35)	06:03
	16:54	17:46	18:37	20:29	08:09 (35)	21:19
10	08:48	08:09	07:12	07:01	07:37 (35)	06:01
	16:55	17:48	18:38	20:31	08:10 (35)	21:21
11	08:47	08:07	07:09	06:59	07:35 (35)	05:59
	16:56	17:50	18:40	20:33	08:11 (35)	21:23
12	08:47	08:06	07:07	06:57	07:32 (35)	05:58
	16:58	17:52	18:42	20:35	08:10 (35)	21:24
13	08:46	08:04	07:05	06:54	07:30 (35)	05:56
	16:59	17:54	18:44	20:36	08:11 (35)	21:26
14	08:45	08:02	07:03	06:52	07:28 (35)	05:54
	17:01	17:55	18:45	20:38	08:12 (35)	21:27
15	08:44	08:00	07:00	06:50	07:26 (35)	05:53
	17:02	17:57	18:47	20:40	08:12 (35)	21:29
16	08:44	07:58	06:58	06:48	07:24 (35)	05:51
	17:04	17:59	18:49	20:41	08:12 (35)	21:30
17	08:43	07:56	06:56	06:46	07:22 (35)	05:50
	17:06	18:01	18:51	20:43	08:12 (35)	21:32
18	08:42	07:54	06:53	06:44	07:22 (35)	05:48
	17:07	18:03	18:52	20:45	08:12 (35)	21:33
19	08:41	07:52	06:51	06:41	07:21 (35)	05:47
	17:09	18:05	18:54	20:46	08:12 (35)	21:35
20	08:40	07:50	06:49	06:39	07:21 (35)	05:46
	17:10	18:06	18:56	20:48	08:12 (35)	21:36
21	08:39	07:48	06:47	06:37	07:21 (35)	05:44
	17:12	18:08	18:57	20:50	08:12 (35)	21:38
22	08:38	07:46	06:44	06:35	07:20 (35)	05:43
	17:14	18:10	18:59	20:51	08:11 (35)	21:39
23	08:36	07:44	06:42	06:33	07:20 (35)	05:42
	17:15	18:12	19:01	20:53	08:11 (35)	21:40
24	08:35	07:42	06:40	06:31	07:20 (35)	05:40
	17:17	18:14	19:02	20:55	08:10 (35)	21:42
25	08:34	07:40	06:37	06:29	07:20 (35)	05:39
	17:19	18:15	19:04	20:56	08:10 (35)	21:43
26	08:33	07:38	06:35	06:27	07:20 (35)	05:38
	17:21	18:17	19:06	20:58	08:09 (35)	21:44
27	08:31	07:36	06:33	06:25	07:20 (35)	05:37
	17:22	18:19	19:08	21:00	08:08 (35)	21:46
28	08:30	07:33	06:30	06:23	07:20 (35)	05:36
	17:24	18:21	19:09	21:01	08:07 (35)	21:47
29	08:29		07:28	06:21	07:22 (35)	05:35
	17:26		20:11	21:03	08:07 (35)	21:48
30	08:27		07:26	06:19	07:22 (35)	05:34
	17:28		20:13	21:05	08:06 (35)	21:49
31	08:26		07:24			05:33
	17:30		20:14			21:51
Potential sun hours	260	278	367	416	484	497
Total, worst case				1105		456
Sun reduction				0,38		0,43
Oper. time red.				0,97		0,97
Wind dir. red.				0,62		0,63
Total reduction				0,23		0,26
Total, real				254		120

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)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (35)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29	06:06	06:48 (39)	06:55	07:34 (35)	07:43
	22:06	21:34	3	06:51 (39)	20:33	36
2	05:30	06:07	06:50 (39)	06:56	07:35 (35)	07:45
	22:05	21:32	12	07:58 (35)	20:30	33
3	05:31	06:09	07:44 (35)	06:58	07:37 (35)	07:46
	22:05	21:31	17	08:01 (35)	20:28	30
4	05:32	06:10	07:41 (35)	07:00	07:38 (35)	07:48
	22:04	21:29	23	08:04 (35)	20:26	26
5	05:32	06:12	07:40 (35)	07:01	07:40 (35)	07:50
	22:04	21:27	26	08:06 (35)	20:24	23
6	05:33	06:13	07:37 (35)	07:03	07:41 (35)	07:51
	22:03	21:26	30	08:07 (35)	20:21	19
7	05:34	06:15	07:37 (35)	07:04	07:43 (35)	07:53
	22:03	21:24	32	08:09 (35)	20:19	14
8	05:35	06:16	07:35 (35)	07:06	07:44 (35)	07:55
	22:02	21:22	35	08:10 (35)	20:17	9
9	05:36	06:18	07:33 (35)	07:08	07:46 (38)	07:56
	22:02	21:20	38	08:11 (35)	20:14	6
10	05:37	06:19	07:33 (35)	07:09	07:47 (38)	07:58
	22:01	21:18	39	08:12 (35)	20:12	4
11	05:38	06:21	07:31 (35)	07:11	07:49 (38)	08:00
	22:00	21:16	42	08:13 (35)	20:10	2
12	05:39	06:23	07:31 (35)	07:12	08:02	07:56
	21:59	21:15	43	08:14 (35)	20:08	18:59
13	05:40	06:24	07:29 (35)	07:14	08:03	07:58
	21:58	21:13	45	08:14 (35)	20:05	18:57
14	05:41	06:26	07:29 (35)	07:16	08:05	07:59
	21:58	21:11	46	08:15 (35)	20:03	18:55
15	05:42	06:27	07:28 (35)	07:17	08:07	08:01
	21:57	21:09	47	08:15 (35)	20:01	18:52
16	05:44	06:29	07:28 (35)	07:19	08:08	08:03
	21:56	21:07	48	08:16 (35)	19:58	18:50
17	05:45	06:31	07:27 (35)	07:20	08:10	08:05
	21:54	21:05	49	08:16 (35)	19:56	18:48
18	05:46	06:32	07:27 (35)	07:22	08:12	08:06
	21:53	21:03	50	08:17 (35)	19:54	18:46
19	05:47	06:34 (39)	06:34	07:24	08:13	08:08
	21:52	7	06:44 (39)	21:01	50	08:16 (35)
20	05:49	06:35 (39)	06:35	07:25	08:15	08:10
	21:51	11	06:46 (39)	20:59	51	08:17 (35)
21	05:50	06:34 (39)	06:37	07:25	08:17	08:11
	21:50	13	06:47 (39)	20:56	51	08:16 (35)
22	05:51	06:35 (39)	06:39	07:25	08:19	08:13
	21:49	13	06:48 (39)	20:54	51	08:16 (35)
23	05:53	06:36 (39)	06:40	07:25	08:20	08:15
	21:47	12	06:48 (39)	20:52	51	08:16 (35)
24	05:54	06:38 (39)	06:42	07:25	08:22	08:16
	21:46	12	06:50 (39)	20:50	51	08:16 (35)
25	05:55	06:39 (39)	06:43	07:24	08:24	08:18
	21:45	11	06:50 (39)	20:48	51	08:15 (35)
26	05:57	06:40 (39)	06:45	07:25	08:26	08:19
	21:43	11	06:51 (39)	20:46	50	08:15 (35)
27	05:58	06:42 (39)	06:47	07:26	08:27	08:21
	21:42	10	06:52 (39)	20:44	48	08:14 (35)
28	06:00	06:43 (39)	06:48	07:28	08:29	08:22
	21:40	9	06:52 (39)	20:41	46	08:14 (35)
29	06:01	06:44 (39)	06:50	07:29	08:31	08:24
	21:39	8	06:52 (39)	20:39	43	08:12 (35)
30	06:03	06:46 (39)	06:51	07:31	08:33	08:25
	21:37	6	06:52 (39)	20:37	41	08:12 (35)
31	06:04	06:47 (39)	06:53	07:32	08:35	08:27
	21:36	5	06:52 (39)	20:35	38	08:10 (35)
Potential sun hours	501	453	381	332	267	245
Total, worst case	128	1247	202			
Sun reduction	0,40	0,42	0,36			
Oper. time red.	0,97	0,97	0,97			
Wind dir. red.	0,67	0,62	0,61			
Total reduction	0,26	0,25	0,21			
Total, real	33	316	43			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

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Calculated:

21-11-2013 11:20/2.7.490

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (36)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51	08:24	07:31	07:21	07:57 (38)	06:17
	16:44	17:31	18:23	20:16	09:22 (35)	21:06
2	08:51	08:23	07:29	07:19	07:54 (38)	06:15
	16:45	17:33	18:24	20:18	09:22 (35)	21:08
3	08:50	08:21	07:27	07:17	07:52 (38)	06:13
	16:46	17:35	18:26	20:19	09:23 (35)	21:10
4	08:50	08:20	07:25	07:14	07:50 (38)	06:11
	16:47	17:37	18:28	20:21	09:23 (35)	21:11
5	08:50	08:18	07:23	07:12	07:50 (38)	06:10
	16:48	17:39	18:30	20:23	09:24 (35)	21:13
6	08:50	08:16	07:20	07:10	07:50 (38)	06:08
	16:50	17:41	18:31	20:24	09:23 (35)	21:15
7	08:49	08:15	07:18	07:08	07:51 (38)	06:06
	16:51	17:42	18:33	20:26	09:24 (35)	21:16
8	08:49	08:13	07:16	07:05	07:52 (38)	06:04
	16:52	17:44	18:35	20:28	09:24 (35)	21:18
9	08:48	08:11	07:14	07:03	07:54 (38)	06:03
	16:54	17:46	18:37	20:29	09:24 (35)	21:19
10	08:48	08:09	07:12	07:01	07:56 (38)	06:01
	16:55	17:48	18:38	20:31	09:24 (35)	21:21
11	08:47	08:07	07:09	06:59	08:00 (35)	05:59
	16:56	17:50	18:40	20:33	09:24 (35)	21:23
12	08:47	08:06	07:07	06:57	07:59 (35)	05:58
	16:58	17:52	18:42	20:35	09:23 (35)	21:24
13	08:46	08:04	07:05	06:54	07:58 (35)	05:56
	16:59	17:53	18:44	20:36	09:23 (35)	21:26
14	08:45	08:02	07:02	06:52	07:58 (35)	05:54
	17:01	17:55	18:45	20:38	09:23 (35)	21:27
15	08:44	08:00	07:00	06:50	07:58 (35)	05:53
	17:02	17:57	18:47	20:40	09:23 (35)	21:29
16	08:44	07:58	06:58	06:48	07:57 (35)	05:51
	17:04	17:59	18:49	20:41	09:23 (35)	21:30
17	08:43	07:56	06:56	06:46	07:57 (35)	05:50
	17:05	18:01	18:51	20:43	09:22 (35)	21:32
18	08:42	07:54	06:53	06:43	07:57 (35)	05:48
	17:07	18:03	18:52	20:45	09:22 (35)	21:33
19	08:41	07:52	06:51	06:41	07:57 (35)	05:47
	17:09	18:04	18:54	20:46	09:21 (35)	21:35
20	08:40	07:50	06:49	06:39	07:57 (35)	05:46
	17:10	18:06	18:56	20:48	09:21 (35)	21:36
21	08:39	07:48	06:47	06:37	07:57 (35)	05:44
	17:12	18:08	18:57	20:50	09:20 (35)	21:38
22	08:38	07:46	06:44	06:35	07:57 (35)	05:43
	17:14	18:10	18:59	20:51	09:19 (35)	21:39
23	08:36	07:44	06:42	06:33	07:57 (35)	05:42
	17:15	18:12	19:01	20:53	09:19 (35)	21:40
24	08:35	07:42	06:40	06:31	07:57 (35)	05:40
	17:17	18:14	19:02	20:55	09:18 (35)	21:42
25	08:34	07:40	06:37	06:29	07:57 (35)	05:39
	17:19	18:15	19:04	20:56	09:17 (35)	21:43
26	08:33	07:38	06:35	06:27	07:57 (35)	05:38
	17:21	18:17	19:06	20:58	09:16 (35)	21:44
27	08:31	07:36	06:33	06:25	07:57 (35)	05:37
	17:22	18:19	19:08	21:00	09:15 (35)	21:46
28	08:30	07:33	06:30	06:23	07:57 (35)	05:36
	17:24	18:21	19:09	21:01	09:14 (35)	21:47
29	08:29		07:28	06:21	07:59 (35)	05:35
	17:26		20:11	21:03	09:14 (35)	21:48
30	08:27		07:26	06:19	07:59 (35)	05:34
	17:28		20:13	21:05	09:13 (35)	21:49
31	08:26		07:24	06:17	05:33	06:21 (39)
	17:30		20:14	21:09	21:51	06:40 (39)
Potential sun hours	260	278	367	416	484	497
Total, worst case		25	713	2545	1348	771
Sun reduction		0,27	0,30	0,38	0,43	0,38
Oper. time red.		0,97	0,97	0,97	0,97	0,97
Wind dir. red.		0,56	0,59	0,59	0,61	0,58
Total reduction		0,15	0,17	0,22	0,25	0,22
Total, real		4	123	561	342	166

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 3: Dubbele wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:20/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (36)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29	20:52 (33)	06:06	54	06:48 (39)	06:55	07:59 (35)	07:43	07:36	08:27		
	22:05	25	21:17 (33)	21:34	09:08 (35)	20:33	09:23 (35)	19:24	17:18	16:38		
2	05:30	20:53 (33)	06:07		06:50 (39)	06:56	07:54 (38)	07:45	07:38	08:28		
	22:05	24	21:17 (33)	21:32	09:10 (35)	20:30	09:22 (35)	19:21	17:16	16:38		
3	05:31	20:55 (33)	06:09		08:16 (35)	06:58	07:52 (38)	07:46	07:40	08:30		
	22:05	22	21:17 (33)	21:31	09:11 (35)	20:28	09:22 (35)	19:19	17:14	16:37		
4	05:32	20:55 (33)	06:10		08:14 (35)	07:00	07:49 (38)	07:48	07:42	08:31		
	22:04	21	21:16 (33)	21:29	09:12 (35)	20:26	09:21 (35)	19:17	17:13	16:36		
5	05:32		06:35 (39)	06:12	08:14 (35)	07:01	07:48 (38)	07:50	07:43	08:32		
	22:04	25	21:16 (33)	21:27	09:14 (35)	20:24	09:21 (35)	19:15	17:11	16:36		
6	05:33		06:34 (39)	06:13	08:12 (35)	07:03	07:46 (38)	07:51	07:45	08:34		
	22:03	26	21:16 (33)	21:26	09:15 (35)	20:21	09:19 (35)	19:12	17:09	16:35		
7	05:34		06:33 (39)	06:15	08:12 (35)	07:04	07:45 (38)	07:53	07:47	08:35		
	22:03	24	21:14 (33)	21:24	09:16 (35)	20:19	09:19 (35)	19:10	17:08	16:35		
8	05:35		06:31 (39)	06:16	08:11 (35)	07:06	07:44 (38)	07:55	07:49	08:36		
	22:02	19	21:10 (33)	21:22	09:17 (35)	20:17	09:18 (35)	19:08	17:06	16:35		
9	05:36		06:31 (39)	06:18	08:09 (35)	07:08	07:46 (38)	07:56	07:51	08:37		
	22:02	15	06:46 (39)	21:20	09:17 (35)	20:14	09:17 (35)	19:06	17:04	16:34		
10	05:37		06:30 (39)	06:19	08:09 (35)	07:09	07:47 (38)	07:58	07:52	08:38		
	22:01	17	06:47 (39)	21:18	09:19 (35)	20:12	09:15 (35)	19:03	17:03	16:34		
11	05:38		06:30 (39)	06:21	08:08 (35)	07:11	07:49 (38)	08:00	07:54	08:39		
	22:00	18	06:48 (39)	21:16	09:19 (35)	20:10	09:15 (35)	19:01	17:01	16:34		
12	05:39		06:29 (39)	06:23	08:07 (35)	07:12	07:51 (38)	08:01	07:56	08:40		
	21:59	19	06:48 (39)	21:15	09:20 (35)	20:08	09:14 (35)	18:59	17:00	16:34		
13	05:40		06:29 (39)	06:24	08:06 (35)	07:14	07:52 (38)	08:03	07:58	08:41		
	21:58	20	06:49 (39)	21:13	09:21 (35)	20:05	09:12 (35)	18:57	16:58	16:34		
14	05:41		06:28 (39)	06:26	08:06 (35)	07:16	07:54 (38)	08:05	07:59	08:42		
	21:57	22	06:50 (39)	21:11	09:22 (35)	20:03	09:11 (35)	18:55	16:57	16:34		
15	05:42		06:28 (39)	06:27	08:05 (35)	07:17	07:55 (38)	08:07	08:01	08:43		
	21:57	22	06:50 (39)	21:09	09:22 (35)	20:01	09:08 (35)	18:52	16:55	16:34		
16	05:44		06:28 (39)	06:29	08:05 (35)	07:19	07:57 (38)	08:08	08:03	08:44		
	21:56	23	06:51 (39)	21:07	09:23 (35)	19:58	09:07 (35)	18:50	16:54	16:34		
17	05:45		06:29 (39)	06:31	08:04 (35)	07:20	07:58 (38)	08:10	08:05	08:45		
	21:54	22	06:51 (39)	21:05	09:23 (35)	19:56	09:05 (35)	18:48	16:52	16:34		
18	05:46		06:31 (39)	06:32	08:04 (35)	07:22	08:00 (38)	08:12	08:06	08:46		
	21:53	22	06:53 (39)	21:03	09:24 (35)	19:54	09:03 (35)	18:46	16:51	16:35		
19	05:47		06:32 (39)	06:34	08:03 (35)	07:24	08:02 (38)	08:13	08:08	08:46		
	21:52	21	06:53 (39)	21:01	09:24 (35)	19:51	09:01 (35)	18:44	16:50	16:35		
20	05:49		06:33 (39)	06:35	08:03 (35)	07:25	08:11 (35)	08:15	08:10	08:47		
	21:51	20	06:53 (39)	20:58	09:24 (35)	19:49	08:58 (35)	18:42	16:49	16:35		
21	05:50		06:34 (39)	06:37	08:02 (35)	07:27	08:13 (35)	08:17	08:11	08:48		
	21:50	19	06:53 (39)	20:56	09:24 (35)	19:47	08:55 (35)	18:40	16:47	16:36		
22	05:51		06:35 (39)	06:39	08:02 (35)	07:28	08:15 (35)	08:19	08:13	08:48		
	21:49	19	06:54 (39)	20:54	09:25 (35)	19:44	08:51 (35)	18:38	16:46	16:36		
23	05:53		06:36 (39)	06:40	08:01 (35)	07:30	08:19 (35)	08:20	08:15	08:49		
	21:47	29	08:47 (35)	20:52	09:25 (35)	19:42	08:47 (35)	18:36	16:45	16:37		
24	05:54		06:38 (39)	06:42	08:01 (35)	07:32	08:25 (35)	08:22	08:16	08:49		
	21:46	35	08:52 (35)	20:50	09:25 (35)	19:40	08:41 (35)	18:34	16:44	16:37		
25	05:55		06:39 (39)	06:43	08:00 (35)	07:33	07:24		08:18	08:50		
	21:45	40	08:55 (35)	20:48	09:25 (35)	19:37	17:32	6	08:11 (15)	16:43		
26	05:57		06:40 (39)	06:45	08:00 (35)	07:35	07:26		08:07 (15)	08:19		
	21:43	44	08:57 (35)	20:46	09:25 (35)	19:35	17:30	6	08:13 (15)	16:42		
27	05:58		06:42 (39)	06:47	07:59 (35)	07:37	07:27		08:09 (15)	08:21		
	21:42	47	09:00 (35)	20:44	09:24 (35)	19:33	17:28	5	08:14 (15)	16:41		
28	06:00		06:43 (39)	06:48	08:00 (35)	07:38	07:29		08:11 (15)	08:22		
	21:40	49	09:02 (35)	20:41	09:25 (35)	19:31	17:26	4	08:15 (15)	16:40		
29	06:01		06:44 (39)	06:50	07:59 (35)	07:40	07:31		08:13 (15)	08:24		
	21:39	52	09:04 (35)	20:39	09:24 (35)	19:28	17:24	2	08:15 (15)	16:40		
30	06:03		06:46 (39)	06:51	07:59 (35)	07:41	07:33		08:15 (15)	08:25		
	21:37	53	09:06 (35)	20:37	09:24 (35)	19:26	17:22	2	08:16 (15)	16:39		
31	06:04		06:47 (39)	06:53	07:58 (35)		07:35			08:51		
	21:36	54	09:07 (35)	20:35	09:23 (35)		17:20			16:43		
Potential sun hours	501		453		381		332		267	245		
Total, worst case	868		2312		1731		25					
Sun reduction	0,40		0,42		0,36		0,31					
Oper. time red.	0,97		0,97		0,97		0,97					
Wind dir. red.	0,63		0,59		0,59		0,56					
Total reduction	0,24		0,24		0,21		0,17					
Total, real	209		559		358		4					

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (28)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:40 (9)	08:24	09:14 (8)	07:31	08:08 (11)	07:21	07:57 (16)	06:17	06:55 (13)	05:32
	16:44	96	15:41 (2)	17:31	15:59 (2)	18:23	09:28 (8)	20:16	19:09 (1)	21:06	07:41 (10)	21:52
2	08:51		09:40 (9)	08:23	09:11 (8)	07:29	08:06 (11)	07:19	07:54 (16)	06:15	06:53 (13)	05:32
	16:45	99	15:42 (2)	17:33	15:58 (2)	18:24	08:27 (11)	20:18	19:08 (1)	21:08	07:40 (10)	21:53
3	08:50		09:40 (9)	08:21	09:09 (8)	07:27	08:04 (11)	07:17	07:52 (16)	06:13	06:51 (13)	05:31
	16:46	102	15:44 (2)	17:35	15:58 (2)	18:26	08:27 (11)	20:19	19:09 (1)	21:10	07:40 (10)	21:54
4	08:50		09:39 (9)	08:19	09:08 (8)	07:25	08:01 (11)	07:14	07:50 (16)	06:11	06:50 (13)	05:30
	16:47	104	15:44 (2)	17:37	15:57 (2)	18:28	08:27 (11)	20:21	19:09 (1)	21:11	07:40 (10)	21:55
5	08:50		09:39 (9)	08:18	09:07 (8)	07:23	08:00 (11)	07:12	07:48 (16)	06:10	06:48 (13)	05:29
	16:49	105	15:45 (2)	17:39	15:57 (2)	18:30	08:27 (11)	20:23	19:10 (1)	21:13	07:40 (10)	21:56
6	08:50		09:38 (9)	08:16	09:06 (8)	07:20	08:00 (11)	07:10	07:45 (16)	06:08	06:46 (13)	05:29
	16:50	107	15:46 (2)	17:41	15:56 (2)	18:31	08:27 (11)	20:24	19:09 (1)	21:15	07:39 (10)	21:57
7	08:49		09:37 (9)	08:14	09:05 (8)	07:18	07:59 (11)	07:08	07:43 (16)	06:06	06:45 (13)	05:28
	16:51	111	15:46 (2)	17:42	15:55 (2)	18:33	08:26 (11)	20:26	19:09 (1)	21:16	07:39 (10)	21:58
8	08:49		09:37 (9)	08:13	08:53 (14)	07:16	07:59 (11)	07:05	07:43 (16)	06:04	06:43 (13)	05:28
	16:52	113	15:48 (2)	17:44	15:54 (2)	18:35	08:26 (11)	20:28	19:09 (1)	21:18	07:39 (10)	21:58
9	08:48		09:36 (9)	08:11	08:51 (14)	07:14	08:00 (11)	07:03	07:44 (16)	06:03	06:44 (13)	05:27
	16:54	117	15:49 (2)	17:46	15:52 (2)	18:37	08:25 (11)	20:29	19:09 (1)	21:19	07:39 (10)	21:59
10	08:48		09:35 (9)	08:09	08:49 (14)	07:12	08:01 (11)	07:01	07:46 (16)	06:01	06:44 (13)	05:27
	16:55	118	15:49 (2)	17:48	15:50 (2)	18:38	08:24 (11)	20:31	19:09 (1)	21:21	07:37 (10)	22:00
11	08:47		09:34 (9)	08:07	08:47 (14)	07:09	08:01 (11)	06:59	18:10 (1)	05:59	06:45 (13)	05:26
	16:56	121	15:50 (2)	17:50	15:46 (2)	18:40	08:22 (11)	20:33	19:08 (1)	21:23	07:37 (10)	22:01
12	08:47		09:34 (9)	08:06	08:45 (14)	07:07	08:02 (11)	06:57	18:09 (1)	05:58	06:45 (13)	05:26
	16:58	122	15:52 (2)	17:52	15:43 (8)	18:42	08:21 (11)	20:34	19:07 (1)	21:24	07:36 (10)	22:02
13	08:46		09:33 (9)	08:04	08:43 (14)	07:05	08:04 (11)	06:54	18:09 (1)	05:56	06:46 (13)	05:26
	16:59	125	15:52 (2)	17:54	15:43 (8)	18:44	08:19 (11)	20:36	19:07 (1)	21:26	07:36 (10)	22:02
14	08:45		09:32 (9)	08:02	08:41 (14)	07:02	08:07 (11)	06:52	18:10 (1)	05:54	06:46 (13)	05:26
	17:01	126	15:53 (2)	17:55	15:44 (8)	18:45	08:14 (11)	20:38	19:06 (1)	21:27	07:34 (10)	22:03
15	08:44		09:32 (9)	08:00	08:39 (14)	07:00	08:00 (11)	06:50	18:10 (1)	05:53	06:48 (13)	05:25
	17:02	128	15:54 (2)	17:57	15:44 (8)	18:47	08:00 (11)	20:40	19:06 (1)	21:29	07:33 (10)	22:03
16	08:44		09:31 (9)	07:58	08:38 (14)	06:58	08:00 (11)	06:48	18:10 (1)	05:51	06:50 (13)	05:25
	17:04	129	15:54 (2)	17:59	15:44 (8)	18:49	08:00 (11)	20:41	19:05 (1)	21:30	07:33 (10)	22:04
17	08:43		09:32 (9)	07:56	08:38 (14)	06:56	08:00 (11)	06:46	18:11 (1)	05:50	06:54 (13)	05:25
	17:06	130	15:55 (2)	18:01	15:44 (8)	18:51	08:00 (11)	20:43	19:04 (1)	21:32	07:31 (10)	22:04
18	08:42		09:32 (9)	07:54	08:39 (14)	06:53	08:00 (11)	06:44	18:12 (1)	05:48	07:12 (10)	05:25
	17:07	131	15:56 (2)	18:03	15:43 (8)	18:52	08:00 (11)	20:45	19:03 (1)	21:33	07:12 (10)	05:25
19	08:41		09:33 (9)	07:52	08:40 (14)	06:51	08:00 (11)	06:41	18:12 (1)	05:47	07:15 (10)	05:25
	17:09	130	15:56 (2)	18:05	15:43 (8)	18:54	08:00 (11)	20:46	19:03 (1)	21:35	07:12 (10)	05:25
20	08:40		09:32 (9)	07:50	08:43 (14)	06:49	08:00 (11)	06:39	18:10 (1)	05:46	07:09 (7)	05:25
	17:10	130	15:56 (2)	18:06	15:42 (8)	18:56	08:00 (11)	20:48	19:02 (1)	21:36	07:04 (7)	05:25
21	08:39		09:33 (9)	07:48	09:02 (8)	06:47	17:38 (1)	06:37	07:15 (10)	05:44	07:04 (7)	05:25
	17:12	129	15:57 (2)	18:08	09:42 (8)	18:57	17:51 (1)	20:50	19:00 (1)	21:38	07:23 (7)	05:26
22	08:38		09:34 (9)	07:46	09:03 (8)	06:44	17:33 (1)	06:35	07:13 (10)	05:43	07:02 (7)	05:26
	17:14	129	15:58 (2)	18:10	09:41 (8)	18:59	17:56 (1)	20:51	18:59 (1)	21:39	07:06 (7)	05:26
23	08:36		09:34 (9)	07:44	09:04 (8)	06:42	17:29 (1)	06:33	07:11 (10)	05:42	07:00 (7)	05:26
	17:16	128	15:58 (2)	18:12	09:40 (8)	19:01	17:58 (1)	20:53	18:58 (1)	21:40	07:28 (7)	05:26
24	08:35		09:35 (9)	07:42	09:04 (8)	06:40	17:26 (1)	06:31	07:09 (10)	05:41	06:58 (7)	05:26
	17:17	126	15:59 (2)	18:14	09:38 (8)	19:02	18:01 (1)	20:55	18:56 (1)	21:42	07:30 (7)	05:26
25	08:34		09:35 (9)	07:40	08:17 (11)	06:37	17:24 (1)	06:29	07:08 (10)	05:39	06:56 (7)	05:26
	17:19	123	15:58 (2)	18:15	09:37 (8)	19:04	18:03 (1)	20:56	18:54 (1)	21:43	07:32 (7)	05:26
26	08:33		09:37 (9)	07:38	08:15 (11)	06:35	17:21 (1)	06:27	07:07 (10)	05:38	06:55 (7)	05:27
	17:21	120	15:59 (2)	18:17	09:36 (8)	19:06	18:03 (1)	20:58	18:52 (1)	21:44	07:33 (7)	05:27
27	08:31		09:38 (9)	07:36	08:13 (11)	06:33	17:20 (1)	06:25	07:06 (10)	05:37	06:54 (7)	05:27
	17:22	118	15:59 (2)	18:19	09:34 (8)	19:08	18:05 (1)	21:00	18:50 (1)	21:46	07:34 (7)	05:27
28	08:30		09:39 (9)	07:33	08:10 (11)	06:30	17:19 (1)	06:23	07:00 (13)	05:36	06:53 (7)	05:28
	17:24	114	16:00 (2)	18:21	09:31 (8)	19:09	18:06 (1)	21:01	18:47 (1)	21:47	07:35 (7)	05:28
29	08:29		09:40 (9)				18:18 (1)	06:21	06:59 (13)	05:35	06:52 (7)	05:28
	17:26	110	15:59 (2)				19:07 (1)	21:03	18:44 (1)	21:48	07:36 (7)	05:29
30	08:27		09:42 (9)				18:16 (1)	06:19	06:57 (13)	05:34	06:51 (7)	05:29
	17:28	103	15:59 (2)				19:07 (1)	21:05	07:41 (10)	21:49	07:37 (7)	05:29
31	08:26		09:19 (8)				07:59 (16)			05:33	06:50 (7)	
	17:30	101	16:00 (2)				19:08 (1)			21:50	07:38 (7)	
Potential sun hours	260		278		367		416		484		497	
Total, worst case	3645		1701		749		1872		1239		1726	
Sun reduction	0,18		0,27		0,30		0,38		0,43		0,38	
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99	
Wind dir. red.	0,64		0,60		0,59		0,62		0,64		0,66	
Total reduction	0,12		0,16		0,18		0,24		0,27		0,25	
Total, real	429		273		132		440		336		431	

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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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

Printed/Page

17-03-2014 15:03 / 2

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (28)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:51 (7)	06:06	06:55 (13)	06:55	18:09 (1)	07:43	08:42 (11)	07:36	08:19 (14)	08:27
	22:05	58	07:49 (7)	21:34	07:47 (10)	20:33	19:07 (1)	19:24	08:59 (11)	17:18	15:20 (2)	16:38
2	05:30		06:52 (7)	06:07	06:55 (13)	06:56	07:44 (16)	07:45	08:40 (11)	07:38	08:21 (14)	08:28
	22:05	57	07:49 (7)	21:32	07:48 (10)	20:30	19:07 (1)	19:21	09:01 (11)	17:16	15:22 (2)	16:38
3	05:31		06:53 (7)	06:09	06:54 (13)	06:58	07:42 (16)	07:46	08:39 (11)	07:40	08:23 (14)	08:30
	22:05	57	07:50 (7)	21:31	07:48 (10)	20:28	19:07 (1)	19:19	09:02 (11)	17:14	15:24 (2)	16:37
4	05:32		06:53 (7)	06:10	06:53 (13)	07:00	07:40 (16)	07:48	08:37 (11)	07:42	08:35 (8)	08:31
	22:04	56	07:49 (7)	21:29	07:48 (10)	20:26	19:06 (1)	19:17	09:02 (11)	17:13	15:25 (2)	16:36
5	05:32		06:53 (7)	06:12	06:54 (13)	07:01	07:40 (16)	07:50	08:36 (11)	07:43	08:36 (8)	08:32
	22:04	56	07:49 (7)	21:27	07:49 (10)	20:24	19:06 (1)	19:15	09:02 (11)	17:11	15:26 (2)	16:36
6	05:33		06:54 (7)	06:13	06:55 (13)	07:03	07:41 (16)	07:51	08:36 (11)	07:45	08:37 (8)	08:34
	22:03	55	07:49 (7)	21:26	07:49 (10)	20:21	19:05 (1)	19:12	09:03 (11)	17:09	15:27 (2)	16:36
7	05:34		06:55 (7)	06:15	06:57 (13)	07:04	07:43 (16)	07:53	08:36 (11)	07:47	08:39 (8)	08:35
	22:03	54	07:49 (7)	21:24	07:50 (10)	20:19	19:05 (1)	19:10	09:03 (11)	17:08	15:28 (2)	16:35
8	05:35		06:56 (7)	06:16	06:58 (13)	07:06	07:44 (16)	07:55	08:35 (11)	07:49	08:40 (8)	08:36
	22:02	53	07:49 (7)	21:22	07:49 (10)	20:17	19:03 (1)	19:08	09:02 (11)	17:06	15:29 (2)	16:35
9	05:36		06:55 (7)	06:18	07:00 (13)	07:08	07:46 (16)	07:56	08:35 (11)	07:51	08:42 (8)	08:37
	22:02	53	07:48 (7)	21:20	07:50 (10)	20:14	19:03 (1)	19:06	09:02 (11)	17:04	15:29 (2)	16:35
10	05:37		06:56 (7)	06:19	07:01 (13)	07:09	07:47 (16)	07:58	08:37 (11)	07:52	08:45 (8)	08:38
	22:01	51	07:47 (7)	21:18	07:49 (10)	20:12	19:02 (1)	19:03	09:02 (11)	17:03	15:30 (2)	16:34
11	05:38		06:57 (7)	06:21	07:02 (13)	07:11	07:49 (16)	08:00	08:39 (11)	07:54	08:50 (8)	08:39
	22:00	50	07:47 (7)	21:16	07:49 (10)	20:10	19:01 (1)	19:01	09:01 (11)	17:01	15:30 (2)	16:34
12	05:39		06:58 (7)	06:23	07:04 (13)	07:12	07:51 (16)	08:01	08:40 (11)	07:56	09:14 (9)	08:40
	21:59	48	07:46 (7)	21:14	07:49 (10)	20:08	19:00 (1)	18:59	09:58 (8)	17:00	15:31 (2)	16:34
13	05:40		06:59 (7)	06:24	07:05 (13)	07:14	18:07 (1)	08:03	08:42 (11)	07:58	09:12 (9)	08:41
	21:58	47	07:46 (7)	21:13	07:48 (10)	20:05	18:59 (1)	18:57	10:02 (8)	16:58	15:31 (2)	16:34
14	05:41		07:00 (7)	06:26	07:07 (13)	07:16	18:08 (1)	08:05	08:44 (11)	07:59	09:11 (9)	08:42
	21:57	45	07:45 (7)	21:11	18:52 (1)	20:03	18:58 (1)	18:55	10:05 (8)	16:57	15:32 (2)	16:34
15	05:42		07:01 (7)	06:27	07:08 (13)	07:17	18:08 (1)	08:07	08:46 (11)	08:01	09:10 (9)	08:43
	21:56	43	07:44 (7)	21:09	18:55 (1)	20:01	18:56 (1)	18:52	10:07 (8)	16:55	15:32 (2)	16:34
16	05:44		07:02 (7)	06:29	07:14 (10)	07:19	18:09 (1)	08:08	08:48 (11)	08:03	09:10 (9)	08:44
	21:55	41	07:43 (7)	21:07	18:58 (1)	19:58	18:55 (1)	18:50	10:09 (8)	16:54	15:32 (2)	16:34
17	05:45		07:03 (7)	06:31	07:14 (10)	07:20	18:10 (1)	08:10	09:37 (8)	08:04	09:09 (9)	08:45
	21:54	39	07:42 (7)	21:05	18:59 (1)	19:56	18:52 (1)	18:48	10:10 (8)	16:53	15:32 (2)	16:34
18	05:46		07:05 (7)	06:32	07:15 (10)	07:22	18:11 (1)	08:12	09:35 (8)	08:06	09:09 (9)	08:46
	21:53	37	07:42 (7)	21:03	19:01 (1)	19:54	18:51 (1)	18:46	10:10 (8)	16:51	15:33 (2)	16:35
19	05:47		07:07 (7)	06:34	07:15 (10)	07:24	18:13 (1)	08:13	09:34 (8)	08:08	09:09 (9)	08:46
	21:52	33	07:40 (7)	21:01	19:02 (1)	19:51	18:49 (1)	18:44	10:11 (8)	16:50	15:33 (2)	16:35
20	05:49		07:08 (7)	06:35	07:17 (10)	07:25	18:15 (1)	08:15	09:33 (8)	08:10	09:09 (9)	08:47
	21:51	31	07:39 (7)	20:58	19:04 (1)	19:49	18:45 (1)	18:42	10:12 (8)	16:49	15:33 (2)	16:35
21	05:50		07:10 (7)	06:37	07:18 (10)	07:27	18:18 (1)	08:17	09:33 (8)	08:11	09:09 (9)	08:48
	21:50	27	07:37 (7)	20:56	19:04 (1)	19:47	18:42 (1)	18:40	10:12 (8)	16:48	15:33 (2)	16:36
22	05:51		07:12 (7)	06:39	07:20 (10)	07:28	18:21 (1)	08:19	09:12 (14)	08:13	09:09 (9)	08:48
	21:49	22	07:34 (7)	20:54	19:05 (1)	19:44	18:37 (1)	18:38	10:13 (8)	16:46	15:33 (2)	16:36
23	05:53		07:16 (7)	06:40	07:22 (10)	07:30		08:20	09:10 (14)	08:15	09:09 (9)	08:49
	21:47	14	07:30 (7)	20:52	19:05 (1)	19:42		18:36	10:13 (8)	16:45	15:32 (2)	16:37
24	05:54		07:27 (10)	06:42	18:16 (1)	07:32		08:22	09:09 (14)	08:16	09:09 (9)	08:49
	21:46	9	07:36 (10)	20:50	19:06 (1)	19:40		18:34	10:13 (8)	16:44	15:33 (2)	16:37
25	05:55		07:24 (10)	06:43	18:14 (1)	07:33		07:24	08:08 (14)	08:18	09:10 (9)	08:49
	21:45	15	07:39 (10)	20:48	19:06 (1)	19:37		17:32	09:13 (8)	16:43	15:33 (2)	16:38
26	05:57		07:22 (10)	06:45	18:14 (1)	07:35		07:26	08:07 (14)	08:19	09:10 (9)	08:50
	21:43	18	07:40 (10)	20:46	19:07 (1)	19:35		17:30	09:13 (8)	16:42	15:33 (2)	16:39
27	05:58		07:02 (13)	06:47	18:12 (1)	07:37		07:27	08:09 (14)	08:21	09:11 (9)	08:50
	21:42	28	07:42 (10)	20:44	19:07 (1)	19:33		17:28	09:13 (8)	16:41	15:33 (2)	16:39
28	06:00		07:00 (13)	06:48	18:12 (1)	07:38		07:29	08:11 (14)	08:22	09:11 (9)	08:50
	21:40	34	07:43 (10)	20:41	19:08 (1)	19:31		17:26	09:13 (8)	16:41	15:32 (2)	16:40
29	06:01		06:58 (13)	06:50	18:10 (1)	07:40		07:31	08:13 (14)	08:24	09:13 (9)	08:50
	21:39	40	07:44 (10)	20:39	19:07 (1)	19:28		17:24	09:13 (8)	16:40	15:33 (2)	16:41
30	06:03		06:57 (13)	06:51	18:10 (1)	07:41	08:44 (11)	07:33	08:15 (14)	08:25	09:15 (9)	08:51
	21:37	45	07:46 (10)	20:37	19:08 (1)	19:26	08:57 (11)	17:22	09:13 (8)	16:39	15:33 (2)	16:42
31	06:04		06:56 (13)	06:53	18:09 (1)			07:35	08:17 (14)		08:51	09:40
	21:36	48	07:46 (10)	20:35	19:07 (1)			17:20	15:16 (2)		16:43	15:40
Potential sun hours	501		453		381		332		267		245	
Total, worst case	1264		1729		1208		1193		3298		3038	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99	
Wind dir. red.	0,66		0,62		0,62		0,56		0,64		0,65	
Total reduction	0,26		0,26		0,22		0,17		0,14		0,10	
Total, real	325		450		265		203		461		318	

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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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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17-03-2014 15:03 / 3

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:28/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (29)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June							
1	08:51	09:59 (6)	08:24	09:06 (12)	07:31	08:26 (9)	07:21	07:57 (11)	06:17	09:26 (5)	05:32	06:16 (13)						
	16:44	95	14:03 (3)	17:31	123	14:18 (3)	18:23	30	08:56 (9)	20:16	215	18:22 (2)	21:06	106	11:12 (5)	21:52	56	10:36 (5)
2	08:50	10:00 (6)	08:23	09:04 (12)	07:29	08:27 (9)	07:19	07:54 (11)	06:15	09:26 (5)	05:32	06:15 (13)						
	16:45	95	14:04 (3)	17:33	123	14:18 (3)	18:24	38	17:02 (2)	20:18	219	18:20 (2)	21:08	105	11:11 (5)	21:53	55	10:35 (5)
3	08:50	10:00 (6)	08:21	09:02 (12)	07:27	08:28 (9)	07:17	07:52 (11)	06:13	09:27 (5)	05:31	06:15 (13)						
	16:46	98	14:05 (3)	17:35	125	14:17 (3)	18:26	49	17:09 (2)	20:19	221	18:19 (2)	21:10	103	11:10 (5)	21:54	53	10:34 (5)
4	08:50	09:59 (6)	08:19	09:00 (12)	07:25	08:28 (9)	07:14	07:50 (11)	06:11	09:27 (5)	05:30	06:14 (13)						
	16:47	99	14:05 (3)	17:37	124	14:17 (3)	18:28	55	17:12 (2)	20:21	223	18:19 (2)	21:11	102	11:09 (5)	21:55	53	10:33 (5)
5	08:50	10:00 (6)	08:18	08:59 (12)	07:23	08:30 (9)	07:12	07:48 (11)	06:10	09:27 (5)	05:29	06:13 (13)						
	16:49	100	14:06 (3)	17:39	126	14:17 (3)	18:30	57	17:15 (2)	20:23	225	18:18 (2)	21:13	100	11:07 (5)	21:56	53	10:32 (5)
6	08:50	09:59 (6)	08:16	08:57 (12)	07:20	07:57 (14)	07:10	07:45 (11)	06:08	09:28 (5)	05:29	06:13 (13)						
	16:50	102	14:06 (3)	17:41	125	14:17 (3)	18:31	60	17:17 (2)	20:24	226	18:16 (2)	21:14	98	11:06 (5)	21:57	52	10:32 (5)
7	08:49	09:59 (6)	08:14	08:55 (12)	07:18	07:54 (14)	07:08	07:43 (11)	06:06	09:27 (5)	05:28	06:13 (13)						
	16:51	103	14:06 (3)	17:42	125	14:16 (3)	18:33	60	17:18 (2)	20:26	225	18:14 (2)	21:16	98	11:05 (5)	21:58	51	10:31 (5)
8	08:49	09:59 (6)	08:13	08:53 (12)	07:16	07:52 (14)	07:05	07:43 (11)	06:04	09:27 (5)	05:28	06:12 (10)						
	16:52	105	14:08 (3)	17:44	124	14:16 (3)	18:35	59	17:20 (2)	20:28	225	18:13 (2)	21:18	96	11:03 (5)	21:58	51	10:30 (5)
9	08:48	09:59 (6)	08:11	08:51 (12)	07:14	07:50 (14)	07:03	07:43 (11)	06:03	09:28 (5)	05:27	06:12 (10)						
	16:54	106	14:08 (3)	17:46	121	14:15 (3)	18:37	63	17:21 (2)	20:29	222	18:11 (2)	21:19	94	11:02 (5)	21:59	50	10:30 (5)
10	08:48	09:59 (6)	08:09	08:50 (12)	07:12	07:48 (14)	07:01	07:43 (11)	06:01	09:28 (5)	05:27	06:11 (10)						
	16:55	108	14:09 (3)	17:48	118	14:14 (3)	18:38	69	17:23 (2)	20:31	217	18:09 (2)	21:21	93	11:01 (5)	22:00	49	10:28 (5)
11	08:47	09:58 (6)	08:07	08:51 (12)	07:09	07:45 (14)	06:59	07:44 (11)	05:59	09:29 (5)	05:26	06:11 (10)						
	16:56	109	14:09 (3)	17:50	110	14:13 (3)	18:40	73	17:23 (2)	20:33	213	18:07 (2)	21:23	91	11:00 (5)	22:01	48	10:28 (5)
12	08:47	09:59 (6)	08:06	08:52 (12)	07:07	07:43 (14)	06:57	07:43 (11)	05:58	09:29 (5)	05:26	06:11 (10)						
	16:58	111	14:11 (3)	17:52	102	14:12 (3)	18:42	77	17:24 (2)	20:34	208	18:04 (2)	21:24	89	10:58 (5)	22:02	48	10:28 (5)
13	08:46	09:59 (6)	08:04	08:53 (12)	07:05	07:41 (14)	06:54	07:44 (11)	05:56	09:30 (5)	05:26	06:11 (10)						
	16:59	112	14:11 (3)	17:54	93	14:11 (3)	18:44	95	17:25 (2)	20:36	198	18:00 (2)	21:26	87	10:57 (5)	22:02	47	10:28 (5)
14	08:45	09:59 (6)	08:02	08:42 (9)	07:02	07:40 (14)	06:52	07:45 (11)	05:54	09:29 (5)	05:26	06:11 (10)						
	17:01	114	14:12 (3)	17:55	81	14:10 (3)	18:45	114	17:25 (2)	20:38	187	17:55 (2)	21:27	86	10:55 (5)	22:03	47	10:27 (5)
15	08:44	09:58 (6)	08:00	08:39 (9)	07:00	07:41 (14)	06:50	07:47 (11)	05:53	09:30 (5)	05:25	06:11 (10)						
	17:02	116	14:12 (3)	17:57	69	14:09 (3)	18:47	124	17:26 (2)	20:40	173	11:26 (5)	21:29	85	10:55 (5)	22:03	46	10:27 (5)
16	08:44	09:58 (6)	07:58	08:37 (9)	06:58	07:42 (14)	06:48	07:50 (11)	05:51	09:31 (5)	05:25	06:11 (10)						
	17:04	116	14:12 (3)	17:59	62	14:07 (3)	18:49	130	17:27 (2)	20:41	166	11:25 (5)	21:30	83	10:54 (5)	22:04	45	10:27 (5)
17	08:43	09:58 (6)	07:56	08:35 (9)	06:56	07:43 (14)	06:46	08:01 (8)	05:50	09:32 (5)	05:25	06:11 (10)						
	17:06	117	14:13 (3)	18:01	62	14:05 (3)	18:51	133	17:26 (2)	20:43	156	11:25 (5)	21:32	81	10:53 (5)	22:04	45	10:27 (5)
18	08:42	09:58 (6)	07:54	08:32 (9)	06:53	09:07 (5)	06:44	08:02 (8)	05:48	09:32 (5)	05:25	06:11 (10)						
	17:07	119	14:14 (3)	18:03	59	14:01 (3)	18:52	128	17:27 (2)	20:45	154	11:24 (5)	21:33	79	10:51 (5)	22:05	45	10:27 (5)
19	08:41	09:58 (6)	07:52	08:30 (9)	06:51	09:04 (5)	06:41	08:03 (8)	05:47	09:32 (5)	05:25	06:11 (10)						
	17:09	121	14:15 (3)	18:05	55	13:58 (3)	18:54	134	17:27 (2)	20:46	152	11:24 (5)	21:35	78	10:50 (5)	22:05	45	10:27 (5)
20	08:40	09:58 (6)	07:50	08:28 (9)	06:49	09:01 (5)	06:39	08:03 (8)	05:46	09:33 (5)	05:25	06:11 (10)						
	17:10	120	14:14 (3)	18:06	48	13:53 (3)	18:56	139	17:27 (2)	20:48	150	11:23 (5)	21:36	76	10:49 (5)	22:05	44	10:26 (5)
21	08:39	09:58 (6)	07:48	08:27 (9)	06:47	08:59 (5)	06:37	08:04 (8)	05:44	09:34 (5)	05:25	06:11 (10)						
	17:12	122	14:15 (3)	18:08	30	08:57 (9)	18:57	145	17:27 (2)	20:50	147	11:22 (5)	21:38	74	10:48 (5)	22:06	44	10:26 (5)
22	08:38	09:59 (6)	07:46	08:27 (9)	06:44	08:57 (5)	06:35	08:06 (8)	05:43	09:35 (5)	05:26	06:11 (10)						
	17:14	122	14:16 (3)	18:10	31	08:58 (9)	18:59	149	17:27 (2)	20:51	142	11:21 (5)	21:39	72	10:47 (5)	22:06	44	10:26 (5)
23	08:36	09:58 (6)	07:44	08:27 (9)	06:42	08:54 (5)	06:33	08:07 (8)	05:42	09:35 (5)	05:26	06:12 (10)						
	17:16	123	14:16 (3)	18:12	31	08:58 (9)	19:01	152	17:26 (2)	20:53	138	11:20 (5)	21:40	70	10:45 (5)	22:06	44	10:27 (5)
24	08:35	09:59 (6)	07:42	08:25 (9)	06:40	08:53 (5)	06:31	08:09 (8)	05:41	09:36 (5)	05:26	06:12 (10)						
	17:17	124	14:17 (3)	18:14	32	08:57 (9)	19:02	154	17:26 (2)	20:55	133	11:20 (5)	21:42	68	10:44 (5)	22:06	45	10:28 (5)
25	08:34	09:58 (6)	07:40	08:25 (9)	06:37	08:51 (5)	06:29	08:12 (8)	05:39	09:37 (5)	05:26	06:12 (10)						
	17:19	124	14:16 (3)	18:15	32	08:57 (9)	19:04	158	17:26 (2)	20:56	125	11:18 (5)	21:43	66	10:43 (5)	22:06	45	10:28 (5)
26	08:33	09:59 (6)	07:38	08:26 (9)	06:35	08:49 (5)	06:27	09:26 (5)	05:38	09:37 (5)	05:27	06:13 (10)						
	17:21	123	14:17 (3)	18:17	31	08:57 (9)	19:06	160	17:25 (2)	20:58	111	11:17 (5)	21:44	65	10:42 (5)	22:06	45	10:29 (5)
27	08:31	09:59 (6)	07:36	08:26 (9)	06:33	07:20 (8)	06:25	09:26 (5)	05:37	09:38 (5)	05:27	06:13 (10)						
	17:22	123	14:17 (3)	18:19	31	08:57 (9)	19:08	178	17:25 (2)	21:00	110	11:16 (5)	21:46	63	10:41 (5)	22:06	46	10:29 (5)
28	08:30	10:00 (6)	07:33	08:25 (9)	06:30	07:16 (8)	06:23	09:26 (5)	05:36	09:39 (5)	05:28	06:14 (10)						
	17:24	124	14:18 (3)	18:21	31	08:56 (9)	19:09	188	17:25 (2)	21:01	109	11:15 (5)	21:47	61	10:40 (5)	22:06	46	10:30 (5)
29	08:29	09:59 (6)		07:28		08:14 (8)	06:21	09:27 (5)	05:35	09:39 (5)	05:28	06:14 (10)						
	17:26	125	14:18 (3)			20:11	194	18:24 (2)	21:03	108	11:15 (5)	21:48	60	10:39 (5)	22:06	46	10:30 (5)	
30	08:27	09:59 (6)		07:26		08:01 (11)	06:19	09:26 (5)	05:34			09:40 (5)	05:29			06:15 (10)		
	17:28	124	14:17 (3)			20:13	201	18:23 (2)	21:05	107	11:13 (5)	21:49	57	10:37 (5)	22:06	48	10:32 (5)	
31	08:26	10:00 (6)		07:24		07:59 (11)			05:33			09:40 (5)						
	17:30	122	14:18 (3)			20:14	208	18:22 (2)				21:50	56	10:36 (5)				
Potential sun hours	260		278		367		415		484		497							
Total, worst case		3522		2224		3574		5205		2542		1436						
Sun reduction		0,18		0,27		0,30		0,38		0,43		0,38						
Oper. time red.		0,99		0,99		0,99		0,99		0,99		0,99						
Wind dir. red.		0,66		0,64		0,61		0,58		0,56		0,59						
Total reduction		0,12		0,17		0,18		0,22		0,24		0,22						
Total, real		428		384		660		1170		615		323						

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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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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17-03-2014 15:03 / 4

Licensed user:

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Calculated:

21-11-2013 11:28/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (29)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:30	06:15 (10)	06:06	90	09:39 (5)	06:55	07:43 (11)	07:43	08:21 (14)	07:36	08:19 (12)	08:27
2	22:05	49	10:32 (5)	21:34	11:09 (5)	20:33	18:06 (2)	19:24	18:04 (2)	17:18	13:44 (3)	16:38
3	05:31	06:16 (10)	06:07	92	09:39 (5)	06:56	07:41 (11)	07:45	08:23 (14)	07:38	08:21 (12)	08:28
4	22:05	49	10:33 (5)	21:32	11:11 (5)	20:30	18:07 (2)	19:21	18:02 (2)	17:16	13:45 (3)	16:38
5	05:31	06:17 (10)	06:09	94	09:38 (5)	06:58	07:41 (11)	07:46	08:25 (14)	07:40	08:23 (12)	08:30
6	22:05	50	10:35 (5)	21:31	11:12 (5)	20:28	18:09 (2)	19:19	18:01 (2)	17:15	13:46 (3)	16:37
7	05:32	06:17 (10)	06:10	96	09:38 (5)	07:00	07:40 (11)	07:48	08:26 (14)	07:42	08:25 (12)	08:31
8	22:04	51	10:35 (5)	21:29	11:12 (5)	20:26	18:10 (2)	19:17	17:59 (2)	17:13	13:46 (3)	16:36
9	05:32	06:18 (13)	06:12	98	09:38 (5)	07:01	07:40 (11)	07:50	08:28 (14)	07:43	08:27 (12)	08:32
10	22:04	51	10:36 (5)	21:27	11:14 (5)	20:24	18:11 (2)	19:15	17:58 (2)	17:11	13:47 (3)	16:36
11	05:33	06:19 (13)	06:13	100	09:37 (5)	07:03	07:41 (11)	07:51	08:30 (14)	07:45	08:29 (12)	08:34
12	22:03	51	10:37 (5)	21:26	11:15 (5)	20:21	18:12 (2)	19:12	17:56 (2)	17:09	13:47 (3)	16:36
13	05:34	06:20 (13)	06:15	102	09:37 (5)	07:04	07:43 (11)	07:53	08:32 (14)	07:47	08:31 (12)	08:35
14	22:03	53	10:39 (5)	21:24	11:16 (5)	20:19	18:13 (2)	19:10	17:54 (2)	17:08	13:48 (3)	16:35
15	05:35	06:21 (13)	06:16	104	09:36 (5)	07:06	07:44 (11)	07:55	08:33 (14)	07:49	08:33 (12)	08:36
16	22:02	53	10:40 (5)	21:22	11:17 (5)	20:17	18:13 (2)	19:08	17:51 (2)	17:06	13:48 (3)	16:35
17	05:36	06:21 (13)	06:18	106	09:36 (5)	07:08	07:46 (11)	07:56	09:04 (9)	07:51	08:35 (12)	08:37
18	22:01	54	10:40 (5)	21:20	11:19 (5)	20:14	18:14 (2)	19:06	17:48 (2)	17:04	13:48 (3)	16:35
19	05:37	06:22 (13)	06:19	108	09:35 (5)	07:09	07:47 (11)	07:58	09:02 (9)	07:52	09:31 (6)	08:38
20	22:01	55	10:42 (5)	21:18	11:19 (5)	20:12	18:13 (2)	19:03	17:45 (2)	17:03	13:49 (3)	16:34
21	05:38	06:23 (13)	06:21	110	09:35 (5)	07:11	07:49 (11)	08:00	09:01 (9)	07:54	09:31 (6)	08:39
22	22:00	56	10:43 (5)	21:16	11:19 (5)	20:10	18:14 (2)	19:01	17:41 (2)	17:01	13:49 (3)	16:34
23	05:39	09:49 (5)	06:23	112	09:35 (5)	07:12	07:51 (11)	08:01	08:59 (9)	07:56	09:31 (6)	08:40
24	21:59	55	10:44 (5)	21:14	11:21 (5)	20:08	18:15 (2)	18:59	09:28 (9)	17:00	13:49 (3)	16:34
25	05:40	09:49 (5)	06:24	114	09:34 (5)	07:14	07:52 (11)	08:03	08:59 (9)	07:58	09:31 (6)	08:41
26	21:58	56	10:45 (5)	21:13	11:21 (5)	20:05	18:14 (2)	18:57	09:29 (9)	16:58	13:50 (3)	16:34
27	05:41	09:48 (5)	06:26	116	09:34 (5)	07:16	08:04 (8)	08:05	08:58 (9)	07:59	09:31 (6)	08:42
28	21:57	59	10:47 (5)	21:11	11:23 (5)	20:03	18:15 (2)	18:55	09:29 (9)	16:57	13:50 (3)	16:34
29	05:42	09:47 (5)	06:27	118	09:33 (5)	07:17	08:05 (8)	08:07	08:58 (9)	08:01	09:32 (6)	08:43
30	21:56	61	10:48 (5)	21:09	11:23 (5)	20:01	18:14 (2)	18:52	09:30 (9)	16:55	13:50 (3)	16:34
31	05:44	09:47 (5)	06:29	120	09:34 (5)	07:19	08:08 (8)	08:08	08:58 (9)	08:03	09:32 (6)	08:44
32	21:55	62	10:49 (5)	21:07	11:24 (5)	19:58	18:14 (2)	18:50	09:30 (9)	16:54	13:50 (3)	16:34
33	05:45	09:46 (5)	06:31	122	09:33 (5)	07:20	08:13 (8)	08:10	08:58 (9)	08:04	09:32 (6)	08:45
34	21:54	64	10:50 (5)	21:05	11:24 (5)	19:56	18:14 (2)	18:48	09:30 (9)	16:53	13:50 (3)	16:34
35	05:46	09:47 (5)	06:32	124	08:18 (8)	07:22	09:38 (5)	08:12	08:57 (9)	08:06	09:33 (6)	08:46
36	21:53	65	10:52 (5)	21:03	11:25 (5)	19:54	18:14 (2)	18:46	09:29 (9)	16:51	13:51 (3)	16:35
37	05:47	09:46 (5)	06:34	126	08:14 (8)	07:24	09:40 (5)	08:13	08:57 (9)	08:08	09:33 (6)	08:46
38	21:52	67	10:53 (5)	21:01	11:25 (5)	19:51	18:14 (2)	18:44	09:28 (9)	16:50	13:51 (3)	16:35
39	05:49	09:45 (5)	06:35	128	08:12 (8)	07:25	09:40 (5)	08:15	08:57 (9)	08:10	09:34 (6)	08:47
40	21:51	69	10:54 (5)	20:58	11:26 (5)	19:49	18:13 (2)	18:42	09:28 (9)	16:49	13:51 (3)	16:35
41	05:50	09:45 (5)	06:37	130	08:10 (8)	07:27	09:42 (5)	08:17	08:58 (9)	08:11	09:34 (6)	08:48
42	21:50	71	10:56 (5)	20:56	11:26 (5)	19:47	18:13 (2)	18:40	14:17 (3)	16:48	13:51 (3)	16:36
43	05:51	09:44 (5)	06:39	132	08:09 (8)	07:28	09:43 (5)	08:19	08:59 (9)	08:13	09:34 (6)	08:48
44	21:49	73	10:57 (5)	20:54	11:27 (5)	19:44	18:12 (2)	18:38	14:25 (3)	16:46	13:50 (3)	16:36
45	05:53	09:44 (5)	06:40	134	08:07 (8)	07:30	09:45 (5)	08:20	09:01 (9)	08:14	09:34 (6)	08:49
46	21:47	75	10:59 (5)	20:52	11:27 (5)	19:42	18:11 (2)	18:36	14:29 (3)	16:45	13:51 (3)	16:37
47	05:54	09:43 (5)	06:42	136	08:06 (8)	07:32	09:47 (5)	08:22	09:03 (9)	08:16	09:35 (6)	08:49
48	21:46	77	11:00 (5)	20:50	11:28 (5)	19:40	18:11 (2)	18:34	14:32 (3)	16:44	13:51 (3)	16:37
49	05:55	09:43 (5)	06:43	138	08:05 (8)	07:33	09:48 (5)	07:24	08:05 (9)	08:18	09:36 (6)	08:49
50	21:45	78	11:01 (5)	20:48	11:27 (5)	19:37	18:10 (2)	17:32	13:35 (3)	16:43	13:51 (3)	16:38
51	05:57	09:42 (5)	06:45	140	08:04 (8)	07:35	08:27 (14)	07:26	08:07 (9)	08:19	09:37 (6)	08:50
52	21:43	80	11:02 (5)	20:46	11:28 (5)	19:35	18:09 (2)	17:30	13:37 (3)	16:42	13:51 (3)	16:39
53	05:58	09:42 (5)	06:47	142	07:51 (11)	07:37	08:24 (14)	07:27	08:09 (9)	08:21	09:38 (6)	08:50
54	21:42	82	11:04 (5)	20:44	11:27 (5)	19:33	18:08 (2)	17:28	13:38 (3)	16:41	13:52 (3)	16:39
55	06:00	09:41 (5)	06:48	144	07:49 (11)	07:38	08:22 (14)	07:29	08:25 (12)	08:22	09:38 (6)	08:50
56	21:40	84	11:05 (5)	20:41	11:28 (5)	19:31	18:07 (2)	17:26	13:40 (3)	16:41	13:51 (3)	16:40
57	06:01	09:41 (5)	06:50	146	07:46 (11)	07:40	08:21 (14)	07:31	08:22 (12)	08:24	09:39 (6)	08:50
58	21:39	86	11:05 (5)	20:39	11:29 (5)	19:28	18:06 (2)	17:24	13:41 (3)	16:40	13:51 (3)	16:41
59	06:03	09:41 (5)	06:52	148	07:45 (11)	07:41	08:19 (14)	07:33	08:21 (12)	08:25	09:40 (6)	08:51
60	21:37	88	11:07 (5)	20:37	11:30 (5)	19:26	18:04 (2)	17:22	13:42 (3)	16:39	13:52 (3)	16:42
61	06:04	09:40 (5)	06:53	150	07:43 (11)	07:42	07:35	07:35	08:20 (12)	08:24	08:51	08:51
62	21:36	90	11:08 (5)	20:35	11:31 (5)	19:24	17:20	17:20	13:43 (3)	16:37	13:53 (3)	16:43
63	Potential sun hours	501	453	381	5360	332	1751	3644	245	2889		
64	Total, worst case	2008	3967	5360	1751	3644	245	2889				
65	Sun reduction	0,40	0,42	0,36	0,31	0,22	0,16					
66	Oper. time red.	0,99	0,99	0,99	0,99	0,99	0,99					
67	Wind dir. red.	0,57	0,57	0,60	0,63	0,65	0,66					
68	Total reduction	0,23	0,24	0,22	0,19	0,14	0,11					
69	Total, real	454	957	1163	337	524	313					

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

21-11-2013 11:28/2.7.490

Idle start wind speed: Cut in wind speed from power curve

WindPRO is developed by EMD International A/S, Niels Jernesvej 10, DK-9220 Aalborg Ø. Tlf. +45 96 35 44 44, Fax +45 96 35 44 46, e-mail: windpro@emd.dk

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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17-03-2014 15:03 / 6

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (30)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October			November			December		
1	05:29		07:14 (30)	06:05	07:39 (30)	06:55	19:11 (16)	07:43		07:36	08:30 (32)	08:27	11:20 (29)					
	22:05	154	21:15 (19)	21:34	90	20:27 (21)	20:32	9	19:20 (16)	19:24	17:18	102	16:33 (14)	16:38	73	15:19 (20)		
2	05:30		07:15 (30)	06:07		07:42 (30)	06:56		19:07 (16)	07:45	07:38		08:31 (32)	08:28		11:21 (29)		
	22:05	155	21:16 (19)	21:32	84	20:27 (21)	20:30	15	19:22 (16)	19:21	17:16	100	16:32 (14)	16:38	76	15:21 (20)		
3	05:31		07:15 (30)	06:08		07:45 (30)	06:58		19:05 (16)	07:46	07:40		08:32 (32)	08:29		11:21 (29)		
	22:05	153	21:15 (19)	21:31	77	20:26 (21)	20:28	19	19:24 (16)	19:19	17:14	107	16:30 (14)	16:37	78	15:22 (20)		
4	05:31		07:15 (30)	06:10		07:48 (30)	06:59		19:02 (16)	07:48	18:21 (11)	07:42	08:33 (32)	08:31		11:22 (29)		
	22:04	155	21:16 (19)	21:29	68	20:25 (21)	20:26	23	19:25 (16)	19:17	3	18:24 (11)	17:13	16:28 (14)	16:36	80	15:24 (20)	
5	05:32		07:16 (30)	06:12		19:38 (21)	07:01		19:01 (16)	07:50	18:17 (11)	07:43	08:35 (32)	08:32		11:22 (29)		
	22:04	154	21:16 (19)	21:27	47	20:25 (21)	20:23	25	19:26 (16)	19:14	10	18:27 (11)	17:11	16:26 (14)	16:36	81	15:24 (20)	
6	05:33		07:17 (30)	06:13		19:38 (21)	07:03		19:00 (16)	07:51	18:15 (11)	07:45	08:36 (32)	08:33		11:23 (29)		
	22:03	153	21:15 (19)	21:25	46	20:24 (21)	20:21	26	19:26 (16)	19:12	14	18:29 (11)	17:09	16:24 (14)	16:35	82	15:26 (20)	
7	05:34		07:17 (30)	06:15		19:39 (21)	07:04		18:59 (16)	07:53	18:12 (11)	07:47	08:38 (32)	08:35		11:23 (29)		
	22:03	153	21:15 (19)	21:24	45	20:24 (21)	20:19	28	19:27 (16)	19:10	17	18:29 (11)	17:07	16:22 (14)	16:35	83	15:26 (20)	
8	05:35		07:17 (30)	06:16		19:39 (21)	07:06		18:58 (16)	07:55	18:12 (11)	07:49	08:41 (32)	08:36		11:24 (29)		
	22:02	152	21:14 (19)	21:22	44	20:23 (21)	20:17	29	19:27 (16)	19:08	15	18:27 (11)	17:06	16:20 (14)	16:35	84	15:28 (20)	
9	05:36		07:17 (30)	06:18		19:39 (21)	07:07		18:57 (16)	07:56	18:11 (11)	07:50	08:45 (32)	08:37		11:24 (29)		
	22:01	151	21:13 (19)	21:20	43	20:22 (21)	20:14	30	19:27 (16)	19:05	14	18:25 (11)	17:04	16:19 (14)	16:34	84	15:28 (20)	
10	05:37		07:18 (30)	06:19		19:41 (21)	07:09		18:56 (16)	07:58	18:11 (11)	07:52	11:24 (29)	08:38		11:24 (29)		
	22:01	150	21:13 (19)	21:18	41	20:22 (13)	20:12	30	19:26 (16)	19:03	11	18:22 (11)	17:03	96	16:17 (14)	16:34	85	15:29 (20)
11	05:38		07:18 (30)	06:21		19:41 (21)	07:11		18:56 (16)	08:00	09:44 (32)	07:54	11:23 (29)	08:39		11:25 (29)		
	22:00	149	21:12 (19)	21:16	42	20:23 (13)	20:10	31	19:27 (16)	19:01	29	18:19 (11)	17:01	96	15:45 (24)	16:34	84	15:29 (20)
12	05:39		07:19 (30)	06:23		19:43 (21)	07:12		18:55 (16)	08:01	09:40 (32)	07:56	11:22 (29)	08:40		11:25 (29)		
	21:59	148	21:12 (19)	21:14	42	20:25 (13)	20:07	30	19:25 (16)	18:59	42	18:17 (11)	16:59	97	15:45 (24)	16:34	85	15:30 (20)
13	05:40		07:20 (30)	06:24		19:44 (21)	07:14		18:56 (16)	08:03	09:38 (32)	07:57	11:21 (29)	08:41		11:25 (29)		
	21:58	146	21:11 (19)	21:12	41	20:25 (13)	20:05	29	19:25 (16)	18:57	48	18:15 (11)	16:58	99	15:45 (24)	16:34	86	15:30 (20)
14	05:41		07:20 (30)	06:26		19:46 (21)	07:15		18:56 (16)	08:05	09:36 (32)	07:59	11:21 (29)	08:42		11:26 (29)		
	21:57	145	21:10 (19)	21:10	40	20:26 (13)	20:03	28	19:24 (16)	18:54	52	18:13 (11)	16:57	98	15:44 (24)	16:34	86	15:31 (20)
15	05:42		07:21 (30)	06:27		19:47 (21)	07:17		18:56 (16)	08:06	09:34 (32)	08:01	11:20 (29)	08:43		11:26 (29)		
	21:56	142	21:09 (19)	21:08	39	20:26 (13)	20:01	25	19:21 (16)	18:52	56	17:54 (18)	16:55	100	15:44 (24)	16:34	86	15:31 (20)
16	05:43		07:21 (30)	06:29		19:50 (21)	07:19		18:57 (16)	08:08	09:33 (32)	08:03	11:20 (29)	08:44		11:27 (29)		
	21:55	141	21:08 (19)	21:07	35	20:25 (13)	19:58	22	19:19 (16)	18:50	60	17:55 (18)	16:54	100	15:44 (24)	16:34	86	15:32 (20)
17	05:45		07:22 (30)	06:30		19:53 (21)	07:20		18:57 (16)	08:10	09:31 (32)	08:04	11:20 (29)	08:45		11:28 (29)		
	21:54	138	21:07 (19)	21:04	30	20:23 (13)	19:56	19	19:16 (16)	18:48	63	17:54 (18)	16:52	99	15:43 (24)	16:34	86	15:33 (20)
18	05:46		07:22 (30)	06:32		20:03 (13)	07:22		18:58 (16)	08:12	09:30 (32)	08:06	11:19 (29)	08:46		11:29 (29)		
	21:53	137	21:06 (19)	21:02	19	20:22 (13)	19:54	16	19:14 (16)	18:46	66	17:55 (18)	16:51	100	15:43 (24)	16:35	84	15:33 (20)
19	05:47		07:24 (30)	06:34		20:02 (13)	07:23		19:00 (16)	08:13	09:30 (32)	08:08	11:19 (29)	08:46		11:29 (29)		
	21:52	133	21:06 (19)	21:00	17	20:19 (13)	19:51	11	19:11 (16)	18:44	67	17:55 (18)	16:50	99	15:43 (24)	16:35	86	15:34 (20)
20	05:48		07:24 (30)	06:35		20:02 (13)	07:25		19:03 (16)	08:15	09:29 (32)	08:09	11:19 (29)	08:47		11:29 (29)		
	21:51	130	21:05 (19)	20:58	15	20:17 (13)	19:49	6	19:09 (16)	18:42	79	17:55 (18)	16:49	98	15:42 (24)	16:35	86	15:34 (20)
21	05:50		07:25 (30)	06:37		20:03 (13)	07:27		18:47	08:17	09:29 (32)	08:11	11:18 (29)	08:47		11:30 (29)		
	21:50	126	21:04 (19)	20:56	12	20:15 (13)	19:47		18:40	08:19	89	17:55 (18)	16:47	97	15:40 (24)	16:36	86	15:35 (20)
22	05:51		07:26 (30)	06:38		20:03 (13)	07:28		18:19	08:19	09:28 (32)	08:13	11:18 (29)	08:48		11:30 (29)		
	21:48	123	21:03 (19)	20:54	10	20:13 (13)	19:44		18:38	96	17:55 (18)	16:46	96	15:40 (24)	16:36	86	15:35 (20)	
23	05:52		07:26 (30)	06:40		20:04 (13)	07:30		18:20	08:20	09:28 (32)	08:14	11:19 (29)	08:49		11:31 (29)		
	21:47	116	20:27 (21)	20:52	7	20:11 (13)	19:42		18:35	98	17:53 (18)	16:45	93	15:39 (24)	16:37	86	15:36 (20)	
24	05:54		07:28 (30)	06:42		20:04 (13)	07:32		18:22	08:22	09:28 (32)	08:16	11:19 (29)	08:49		11:31 (29)		
	21:46	113	20:28 (21)	20:50	5	20:09 (13)	19:40		18:33	99	17:51 (18)	16:44	93	15:39 (24)	16:37	86	15:36 (20)	
25	05:55		07:29 (30)	06:43		20:06 (13)	07:33		17:24	08:24	08:28 (32)	08:18	11:19 (29)	08:49		11:31 (29)		
	21:44	112	20:28 (21)	20:48	2	20:07 (13)	19:37		17:31	100	16:49 (18)	16:43	90	15:38 (24)	16:38	86	15:36 (20)	
26	05:57		07:30 (30)	06:45		19:35	07:35		17:29	99	16:47 (18)	16:42	88	15:37 (24)	16:38	86	15:37 (20)	
	21:43	110	20:28 (21)	20:46		19:35	07:36		17:27	97	16:44 (18)	16:41	85	15:36 (24)	16:39	86	15:38 (20)	
27	05:58		07:31 (30)	06:47		19:33	07:38		17:27	97	16:44 (18)	16:41	85	15:36 (24)	16:39	86	15:38 (20)	
	21:42	106	20:27 (21)	20:43		19:33	07:38		17:27	97	16:44 (18)	16:41	85	15:36 (24)	16:39	86	15:38 (20)	
28	06:00		07:33 (30)	06:48		19:30	07:40		17:26	94	16:42 (18)	16:40	82	15:34 (24)	16:40	85	15:38 (20)	
	21:40	105	20:28 (21)	20:41		19:30	07:40		17:26	94	16:42 (18)	16:40	82	15:34 (24)	16:40	85	15:38 (20)	
29	06:01		07:34 (30)	06:50		19:28	07:41		17:24	102	16:40 (18)	16:40	77	15:32 (24)	16:41	86	15:39 (20)	
	21:39	101	20:27 (21)	20:39		19:28	07:41		17:24	102	16:40 (18)	16:40	77	15:32 (24)	16:41	86	15:39 (20)	
30	06:02		07:35 (30)	06:51		19:26	07:42		17:22	101	16:38 (18)	16:39	73	15:29 (24)	16:42	85	15:39 (20)	
	21:37	98	20:27 (21)	20:37		19:26	07:42		17:22	101	16:38 (18)	16:39	73	15:29 (24)	16:42	85	15:39 (20)	
31	06:04		07:37 (30)	06:53		19:26	07:43		17:20	100	16:32 (14)			08:50		11:34 (29)		
	21:36	94	20:27 (21)	20:35		19:26	07:44		17:20	100	16:32 (14)			16:43	84	15:38 (20)		
Potential sun hours	501		453		381		332		267		245							
Total, worst case	4143		941		451		1721		2953		2603							
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16							
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99							
Wind dir. red.	0,59		0,56		0,61		0,63		0,67		0,67							
Total reduction	0,24		0,24		0,22		0,19		0,15		0,11							
Total, real	979		223		99		333		433		284							

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (31)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June		
1	08:50		08:24	16:22 (20)	07:31	17:33 (14)	07:21	08:21 (32)	06:17	08:14 (32)	05:32	12:35 (29)	
	16:44		17:31	24 16:46 (20)	18:22	10 17:43 (14)	20:16	229 19:22 (18)	21:06	224 20:24 (16)	21:51	187 21:01 (13)	
2	08:50		08:23	16:22 (20)	07:29	17:32 (14)	07:19	08:19 (32)	06:15	08:15 (32)	05:31	12:35 (29)	
	16:45		17:33	26 16:48 (20)	18:24	13 17:45 (14)	20:18	233 19:20 (18)	21:08	225 20:26 (16)	21:53	186 21:00 (13)	
3	08:50		08:21	16:22 (20)	07:27	17:32 (14)	07:17	08:17 (32)	06:13	08:16 (32)	05:31	12:34 (29)	
	16:46		17:35	27 16:49 (20)	18:26	15 17:47 (14)	20:19	237 19:18 (18)	21:09	225 20:27 (16)	21:54	186 21:00 (13)	
4	08:50		08:19	16:22 (20)	07:25	17:32 (14)	07:14	08:16 (32)	06:11	08:18 (32)	05:30	12:35 (29)	
	16:47		17:37	27 16:49 (20)	18:28	16 17:48 (14)	20:21	238 19:15 (18)	21:11	222 20:29 (16)	21:55	185 21:00 (13)	
5	08:50		08:18	16:22 (20)	07:22	17:32 (14)	07:12	08:15 (32)	06:10	08:20 (32)	05:29	12:35 (29)	
	16:48		17:39	27 16:49 (20)	18:30	19 17:51 (14)	20:23	238 19:10 (24)	21:13	219 20:30 (16)	21:56	183 20:59 (13)	
6	08:49		08:16	16:23 (20)	07:20	17:33 (14)	07:10	08:13 (32)	06:08	08:23 (32)	05:29	12:36 (29)	
	16:50		17:41	27 16:50 (20)	18:31	19 17:52 (14)	20:24	242 19:09 (24)	21:14	212 20:29 (16)	21:57	180 20:58 (13)	
7	08:49		08:14	16:23 (20)	07:18	17:33 (14)	07:08	08:12 (32)	06:06	08:29 (32)	05:28	12:35 (29)	
	16:51		17:42	27 16:50 (20)	18:33	17 17:50 (14)	20:26	245 19:09 (24)	21:16	202 20:30 (16)	21:57	178 20:57 (13)	
8	08:49		08:13	16:24 (20)	07:16	17:34 (14)	07:05	08:12 (32)	06:04	08:29 (32)	05:28	12:36 (29)	
	16:52		17:44	25 16:49 (20)	18:35	15 17:49 (14)	20:28	247 19:08 (24)	21:18	196 20:29 (16)	21:58	172 15:28 (29)	
9	08:48		08:11	16:25 (20)	07:14	17:37 (14)	07:03	08:11 (32)	06:02	08:29 (32)	05:27	12:37 (29)	
	16:54		17:46	24 16:49 (20)	18:37	10 17:47 (14)	20:29	249 19:08 (24)	21:19	196 20:29 (16)	21:59	172 15:29 (29)	
10	08:48		08:09	16:26 (20)	07:11		07:01	08:10 (32)	06:01		08:29 (32)	05:27	12:36 (29)
	16:55		17:48	22 16:48 (20)	18:38		20:31	19:08 (24)	21:21	196 20:28 (16)	22:00	172 15:28 (29)	
11	08:47		08:07	16:27 (20)	07:09		06:59	08:09 (32)	05:59		12:34 (29)	05:26	12:37 (29)
	16:56		17:50	20 16:47 (20)	18:40		20:33	19:06 (24)	21:22	195 20:28 (16)	22:01	171 15:28 (29)	
12	08:46		08:05	16:28 (20)	07:07		06:56	08:09 (32)	05:57		12:34 (29)	05:26	12:37 (29)
	16:58		17:52	17 16:45 (20)	18:42		20:34	19:06 (24)	21:24	193 20:27 (16)	22:01	172 15:29 (29)	
13	08:46		08:04	16:31 (20)	07:05		06:54	08:08 (32)	05:56		12:34 (29)	05:26	12:38 (29)
	16:59		17:53	12 16:43 (20)	18:44		20:36	19:05 (24)	21:26	191 20:26 (16)	22:02	171 15:29 (29)	
14	08:45		08:02	16:35 (20)	07:02		06:52	08:08 (32)	05:54		12:33 (29)	05:25	12:38 (29)
	17:01		17:55	4 16:39 (20)	18:45		20:38	19:04 (24)	21:27	191 20:25 (16)	22:03	171 15:29 (29)	
15	08:44		08:00		07:00	13:00 (29)	06:50	08:08 (32)	05:53		12:33 (29)	05:25	12:38 (29)
	17:02		17:57		18:47	30 13:30 (29)	20:39	19:03 (24)	21:29	188 20:24 (16)	22:03	172 15:30 (29)	
16	08:43		07:58		06:58	12:52 (29)	06:48	08:08 (32)	05:51		12:34 (29)	05:25	12:37 (29)
	17:04		17:59		18:49	43 13:35 (29)	20:41	19:02 (24)	21:30	187 20:46 (13)	22:04	172 15:29 (29)	
17	08:43		07:56		06:56	12:48 (29)	06:46	08:08 (32)	05:50		12:33 (29)	05:25	12:39 (29)
	17:05		18:01		18:50	52 13:40 (29)	20:43	19:01 (24)	21:32	183 20:46 (13)	22:04	171 15:30 (29)	
18	08:42		07:54		06:53	12:44 (29)	06:43	08:07 (32)	05:48		12:33 (29)	05:25	12:39 (29)
	17:07		18:03		18:52	65 18:14 (18)	20:44	18:59 (24)	21:33	178 20:48 (13)	22:05	171 15:30 (29)	
19	08:41		07:52		06:51	12:39 (29)	06:41	08:07 (32)	05:47		12:33 (29)	05:25	12:39 (29)
	17:09		18:04		18:54	80 18:15 (18)	20:46	18:58 (24)	21:35	181 20:50 (13)	22:05	171 15:30 (29)	
20	08:40		07:50		06:49	12:36 (29)	06:39	08:08 (32)	05:46		12:33 (29)	05:25	12:39 (29)
	17:10		18:06		18:56	107 18:17 (18)	20:48	18:56 (24)	21:36	182 20:51 (13)	22:05	171 15:30 (29)	
21	08:39		07:48		06:46	12:33 (29)	06:37	08:08 (32)	05:44		12:34 (29)	05:25	12:39 (29)
	17:12		18:08		18:57	122 18:19 (18)	20:49	18:54 (24)	21:37	182 20:52 (13)	22:06	172 15:31 (29)	
22	08:37		07:46		06:44	12:31 (29)	06:35	08:08 (32)	05:43		12:33 (29)	05:25	12:39 (29)
	17:14		18:10		18:59	134 18:21 (11)	20:51	18:52 (24)	21:39	184 20:53 (13)	22:06	172 15:31 (29)	
23	08:36		07:44		06:42	12:27 (29)	06:33	08:08 (32)	05:42		12:33 (29)	05:26	12:40 (29)
	17:15		18:12		19:01	143 18:22 (11)	20:53	18:48 (24)	21:40	186 20:54 (13)	22:06	171 15:31 (29)	
24	08:35	2 16:28 (20)	07:42		06:39	12:25 (29)	06:31	08:08 (32)	05:40		12:33 (29)	05:26	12:40 (29)
	17:17	2 16:30 (20)	18:13		19:02	151 18:24 (11)	20:55	18:42 (24)	21:42	187 20:55 (13)	22:06	171 15:31 (29)	
25	08:34	16:26 (20)	07:40		06:37	12:23 (29)	06:29	08:09 (32)	05:39		12:33 (29)	05:26	12:40 (29)
	17:19	5 16:31 (20)	18:15		19:04	158 18:26 (11)	20:56	20:15 (16)	21:43	187 20:56 (13)	22:06	171 15:31 (29)	
26	08:33	16:25 (20)	07:38	17:36 (14)	06:35	12:20 (29)	06:27	08:09 (32)	05:38		12:33 (29)	05:27	12:41 (29)
	17:21	9 16:34 (20)	18:17	2 17:37 (14)	19:06	166 18:27 (11)	20:58	20:17 (16)	21:44	188 20:57 (13)	22:06	171 15:32 (29)	
27	08:31	16:24 (20)	07:35	17:35 (14)	06:33	07:35 (32)	06:25	08:10 (32)	05:37		12:34 (29)	05:27	12:40 (29)
	17:22	11 16:35 (20)	18:19	4 17:39 (14)	19:07	190 18:29 (11)	21:00	20:18 (16)	21:45	189 20:59 (13)	22:06	172 15:32 (29)	
28	08:30	16:23 (20)	07:33	17:33 (14)	06:30	07:31 (32)	06:23	08:10 (32)	05:36		12:34 (29)	05:28	12:41 (29)
	17:24	14 16:37 (20)	18:21	8 17:41 (14)	19:09	205 18:31 (11)	21:01	20:20 (16)	21:47	190 21:00 (13)	22:06	172 15:33 (29)	
29	08:28	16:23 (20)			07:28	08:27 (32)	06:21	08:11 (32)	05:35		12:34 (29)	05:28	12:41 (29)
	17:26	17 16:40 (20)			20:11	215 19:32 (11)	21:03	20:21 (16)	21:48	190 21:01 (13)	22:06	171 15:32 (29)	
30	08:27	16:22 (20)			07:26	08:25 (32)	06:19	08:13 (32)	05:34		12:34 (29)	05:29	12:41 (29)
	17:28	19 16:41 (20)			20:12	223 19:31 (11)	21:05	20:23 (16)	21:49	190 21:01 (13)	22:06	172 15:33 (29)	
31	08:26	16:22 (20)			07:23	08:23 (32)			05:33		12:34 (29)		
	17:30	21 16:43 (20)			20:14	229 19:29 (11)			21:50	190 21:01 (13)			
Potential sun hours	260		278		367		415		484		497		
Total, worst case	98		323		2447		7197		6049		5229		
Sun reduction	0,18		0,27		0,30		0,38		0,43		0,38		
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99		
Wind dir. red.	0,69		0,69		0,66		0,66		0,68		0,70		
Total reduction	0,13		0,18		0,20		0,25		0,29		0,26		
Total, real	12		59		483		1801		1740		1370		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

Printed/Page

17-03-2014 15:03 / 8

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (31)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July			August			September			October			November			December		
1	05:29		12:41 (29)	06:05		12:44 (29)	06:55		08:09 (32)	07:43		07:36		15:55 (20)	08:27			
	22:05	172	15:33 (29)	21:34	193	20:37 (16)	20:32	253	19:06 (24)	19:24		17:18	23	16:18 (20)	16:38			
2	05:30		12:41 (29)	06:07		12:45 (29)	06:56		08:08 (32)	07:45		07:38		15:54 (20)	08:28			
	22:05	172	15:33 (29)	21:32	195	20:39 (16)	20:30	252	19:06 (24)	19:21		17:16	24	16:18 (20)	16:38			
3	05:31		12:41 (29)	06:08		12:45 (29)	06:58		08:09 (32)	07:46		07:40		15:54 (20)	08:29			
	22:05	172	15:33 (29)	21:31	195	20:39 (16)	20:28	249	19:06 (24)	19:19		17:14	25	16:19 (20)	16:37			
4	05:32		12:41 (29)	06:10		12:44 (29)	06:59		08:09 (32)	07:48		07:42		15:53 (20)	08:31			
	22:04	172	15:33 (29)	21:29	196	20:39 (16)	20:26	247	19:05 (24)	19:17	7	18:15 (14)	26	16:19 (20)	16:36			
5	05:32		12:42 (29)	06:12		12:45 (29)	07:01		08:09 (32)	07:50		18:12 (14)	07:43	15:53 (20)	08:32			
	22:04	176	21:02 (13)	21:27	197	20:40 (16)	20:23	246	19:06 (24)	19:14	13	18:25 (14)	27	16:20 (20)	16:36			
6	05:33		12:42 (29)	06:13		08:36 (32)	07:03		08:09 (32)	07:51		18:10 (14)	07:45	15:53 (20)	08:33			
	22:03	179	21:04 (13)	21:25	206	20:39 (16)	20:21	242	19:05 (24)	19:12	16	18:26 (14)	27	16:20 (20)	16:35			
7	05:34		12:42 (29)	06:15		08:32 (32)	07:04		08:10 (32)	07:53		18:08 (14)	07:47	15:53 (20)	08:35			
	22:03	182	21:05 (13)	21:24	215	20:40 (16)	20:19	238	19:05 (24)	19:10	18	18:26 (14)	27	16:20 (20)	16:35			
8	05:35		12:42 (29)	06:16		08:29 (32)	07:06		08:10 (32)	07:55		18:07 (14)	07:49	15:53 (20)	08:36			
	22:02	183	21:06 (13)	21:22	221	20:39 (16)	20:17	239	19:09 (18)	19:08	20	18:27 (14)	27	16:20 (20)	16:35			
9	05:36		12:42 (29)	06:18		08:26 (32)	07:07		08:11 (32)	07:56		18:07 (14)	07:50	15:53 (20)	08:37			
	22:01	185	21:07 (13)	21:20	223	20:37 (16)	20:14	237	19:12 (18)	19:05	18	18:25 (14)	26	16:19 (20)	16:34			
10	05:37		12:42 (29)	06:19		08:25 (32)	07:09		08:12 (32)	07:58		18:06 (14)	07:52	15:53 (20)	08:38			
	22:01	187	21:08 (13)	21:18	224	20:36 (16)	20:12	234	19:13 (18)	19:03	16	18:22 (14)	24	16:17 (20)	16:34			
11	05:38		12:42 (29)	06:21		08:23 (32)	07:11		08:13 (32)	08:00		18:05 (14)	07:54	15:54 (20)	08:39			
	22:00	188	21:08 (13)	21:16	224	20:34 (16)	20:10	229	19:14 (18)	19:01	14	18:19 (14)	21	16:15 (20)	16:34			
12	05:39		12:42 (29)	06:23		08:22 (32)	07:12		08:14 (32)	08:01		18:06 (14)	07:56	15:54 (20)	08:40			
	21:59	189	21:09 (13)	21:14	226	20:33 (16)	20:07	230	19:20 (11)	18:59	11	18:17 (14)	16:59	16:13 (20)	16:34			
13	05:40		12:42 (29)	06:24		08:20 (32)	07:14		08:16 (32)	08:03		18:06 (14)	07:57	15:55 (20)	08:41			
	21:58	190	21:10 (13)	21:12	225	20:30 (16)	20:05	224	19:22 (11)	18:57	9	18:15 (14)	16:58	16:12 (20)	16:34			
14	05:41		12:42 (29)	06:26		08:19 (32)	07:15		08:18 (32)	08:05		18:06 (14)	07:59	15:56 (20)	08:42			
	21:57	191	21:10 (13)	21:10	224	20:29 (16)	20:03	218	19:24 (11)	18:54	7	18:13 (14)	16:57	16:10 (20)	16:34			
15	05:42		12:42 (29)	06:27		08:18 (32)	07:17		08:20 (32)	08:06		18:07 (14)	08:01	15:57 (20)	08:43			
	21:56	190	21:09 (13)	21:08	222	20:27 (16)	20:01	206	19:21 (11)	18:52	4	18:11 (14)	16:55	16:08 (20)	16:34			
16	05:43		12:43 (29)	06:29		08:17 (32)	07:19		08:24 (32)	08:08		18:03	16:55	15:58 (20)	08:44			
	21:55	188	21:08 (13)	21:06	221	20:25 (16)	19:58	192	19:19 (11)	18:50		16:54	9	16:07 (20)	16:34			
17	05:45		12:42 (29)	06:30		08:16 (32)	07:20		13:08 (29)	08:10		18:04		16:00 (20)	08:45			
	21:54	189	21:07 (13)	21:04	219	20:23 (16)	19:56	167	19:16 (11)	18:48		16:52	5	16:05 (20)	16:34			
18	05:46		12:42 (29)	06:32		08:15 (32)	07:22		13:10 (29)	08:12		18:06		16:02 (20)	08:46			
	21:53	188	21:06 (13)	21:02	216	20:22 (16)	19:54	160	19:14 (11)	18:46		16:51	2	16:04 (20)	16:35			
19	05:47		12:43 (29)	06:34		08:14 (32)	07:23		13:11 (29)	08:13		18:08			16:46			
	21:52	187	21:06 (13)	21:00	223	18:50 (24)	19:51	153	19:11 (11)	18:44		16:50			16:35			
20	05:48		12:43 (29)	06:35		08:13 (32)	07:25		13:13 (29)	08:15		18:09			16:47			
	21:51	186	21:05 (13)	20:58	234	18:54 (24)	19:49	145	19:09 (11)	18:42		16:49			16:35			
21	05:50		12:43 (29)	06:37		08:12 (32)	07:27		13:16 (29)	08:17		18:11			16:47			
	21:50	185	21:04 (13)	20:56	240	18:57 (24)	19:47	136	19:07 (11)	18:40		16:47			16:36			
22	05:51		12:43 (29)	06:38		08:11 (32)	07:28		13:17 (29)	08:19		18:13			16:48			
	21:48	185	21:03 (13)	20:54	244	18:58 (24)	19:44	127	19:04 (18)	18:38		16:46			16:36			
23	05:52		12:43 (29)	06:40		08:11 (32)	07:30		13:20 (29)	08:20		18:14			16:48			
	21:47	183	21:01 (13)	20:52	246	19:00 (24)	19:42	111	19:02 (18)	18:35		16:45			16:37			
24	05:54		12:44 (29)	06:42		08:10 (32)	07:32		13:22 (29)	08:22		18:16			16:49			
	21:46	181	21:01 (13)	20:50	250	19:01 (24)	19:40	91	18:59 (18)	18:33		16:44			16:37			
25	05:55		12:44 (29)	06:43		08:10 (32)	07:33		13:25 (29)	07:24		18:18			16:49			
	21:44	179	20:59 (13)	20:48	251	19:02 (24)	19:37	69	18:57 (18)	17:31		16:43			16:38			
26	05:57		12:43 (29)	06:45		08:09 (32)	07:35		13:29 (29)	07:26		18:19			16:50			
	21:43	179	20:58 (13)	20:46	253	19:03 (24)	19:35	55	14:24 (29)	17:29		16:42			16:38			
27	05:58		12:43 (29)	06:47		08:09 (32)	07:36		13:32 (29)	07:27		18:21			16:50			
	21:42	186	20:56 (13)	20:43	254	19:04 (24)	19:33	47	14:19 (29)	17:27		16:41			16:39			
28	06:00		12:44 (29)	06:48		08:09 (32)	07:38		13:38 (29)	07:29		16:03 (20)	28	16:22	16:40			
	21:40	188	20:56 (13)	20:41	255	19:04 (24)	19:30	35	14:13 (29)	17:26	7	16:10 (20)	26	16:40	16:40			
29	06:01		12:44 (29)	06:50		08:09 (32)	07:40		13:47 (29)	07:31		16:00 (20)	28	16:40	16:40			
	21:39	189	20:35 (16)	20:39	255	19:05 (24)	19:28	17	14:04 (29)	17:24	13	16:13 (20)	26	16:40	16:41			
30	06:02		12:44 (29)	06:51		08:08 (32)	07:41			07:33		15:58 (20)	28	16:40	16:40			
	21:37	190	20:35 (16)	20:37	256	19:05 (24)	19:26			17:22	17	16:15 (20)	26	16:39	16:42			
31	06:04		12:44 (29)	06:53		08:09 (32)				07:34		15:56 (20)			16:40			
	21:35	193	20:37 (16)	20:35	254	19:05 (24)				17:20	21	16:17 (20)			16:43			
Potential sun hours	501			453			381			332		267			245			
Total, worst case		5704			7057			5049			211		354					
Sun reduction		0,40			0,42			0,36			0,31		0,22					
Oper. time red.		0,99			0,99			0,99			0,99		0,99					
Wind dir. red.		0,69			0,67			0,66			0,66		0,69					
Total reduction		0,27			0,28			0,23			0,20		0,15					
Total, real		1539			1957			1182			42		53					

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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17-03-2014 15:03 / 9

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (32)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:52 (44)	08:24	09:19 (46)	07:31	08:15 (45)	07:21	06:17	07:29 (35)	05:32	06:27 (39)
	16:44	60	13:19 (41)	17:31	11:12 (42)	18:23	11:18 (42)	20:16	21:06	08:26 (35)	21:52	08:05 (35)
2	08:51		09:52 (44)	08:23	09:21 (46)	07:29	08:14 (45)	07:19	06:15	07:29 (35)	05:31	06:28 (39)
	16:45	59	13:19 (41)	17:33	11:13 (42)	18:24	11:17 (42)	20:18	21:08	08:26 (35)	21:53	08:03 (35)
3	08:50		09:53 (44)	08:21	09:22 (46)	07:27	08:14 (45)	07:17	06:13	07:29 (35)	05:31	06:28 (39)
	16:46	58	13:19 (41)	17:35	11:14 (42)	18:26	11:16 (42)	20:19	21:10	08:25 (35)	21:54	08:01 (35)
4	08:50		09:52 (44)	08:20	09:25 (46)	07:25	08:13 (45)	07:14	06:11	07:29 (35)	05:30	06:29 (39)
	16:47	57	13:18 (41)	17:37	11:15 (42)	18:28	11:14 (42)	20:21	21:11	08:26 (35)	21:55	08:06 (39)
5	08:50		09:53 (44)	08:18	10:11 (42)	07:23	08:14 (45)	07:12	06:10	07:29 (35)	05:29	06:30 (39)
	16:49	55	13:18 (41)	17:39	11:17 (42)	18:30	11:13 (42)	20:23	21:13	08:25 (35)	21:56	08:05 (39)
6	08:50		09:53 (44)	08:16	10:10 (42)	07:20	08:14 (45)	07:10	06:08	07:28 (35)	05:29	06:31 (39)
	16:50	53	13:17 (41)	17:41	11:17 (42)	18:31	11:12 (42)	20:24	21:15	08:24 (35)	21:57	08:05 (39)
7	08:49		09:54 (44)	08:15	10:09 (42)	07:18	08:15 (45)	07:08	06:06	07:29 (35)	05:28	06:31 (39)
	16:51	49	13:16 (41)	17:42	11:18 (42)	18:33	11:10 (42)	20:26	21:16	08:25 (35)	21:58	08:06 (39)
8	08:49		09:53 (44)	08:13	10:08 (42)	07:16	08:14 (45)	07:05	06:04	07:29 (35)	05:28	06:33 (39)
	16:52	47	13:14 (41)	17:44	11:19 (42)	18:35	11:08 (42)	20:28	21:18	08:24 (35)	21:59	08:04 (39)
9	08:48		09:53 (44)	08:11	10:08 (42)	07:14	07:50 (47)	07:03	06:03	07:29 (35)	05:27	06:34 (39)
	16:54	38	10:31 (44)	17:46	11:20 (42)	18:37	11:06 (42)	20:29	21:19	08:24 (35)	21:59	08:04 (39)
10	08:48		09:53 (44)	08:09	10:07 (42)	07:12	07:48 (47)	07:01	06:01	06:40 (39)	05:27	06:35 (39)
	16:55	38	10:31 (44)	17:48	11:20 (42)	18:38	11:04 (42)	20:31	21:21	08:23 (35)	22:00	08:04 (39)
11	08:47		09:54 (44)	08:07	10:07 (42)	07:09	07:45 (47)	06:59	05:59	06:39 (39)	05:26	06:36 (39)
	16:56	39	10:33 (44)	17:50	11:21 (42)	18:40	11:00 (42)	20:33	21:23	08:23 (35)	22:01	08:05 (39)
12	08:47		09:55 (44)	08:06	10:06 (42)	07:07	07:43 (47)	06:57	05:58	06:37 (39)	05:26	06:37 (39)
	16:58	38	10:33 (44)	17:52	11:21 (42)	18:42	10:58 (42)	20:35	21:24	08:22 (35)	22:02	08:06 (39)
13	08:46		09:55 (44)	08:04	10:06 (42)	07:05	07:41 (47)	06:54	05:56	06:36 (39)	05:26	06:38 (39)
	16:59	39	10:34 (44)	17:54	11:22 (42)	18:44	10:54 (42)	20:36	21:26	08:22 (35)	22:02	08:07 (39)
14	08:45		09:55 (44)	08:02	10:06 (42)	07:03	07:38 (47)	06:52	05:54	06:34 (39)	05:25	06:39 (39)
	17:01	39	10:34 (44)	17:55	11:22 (42)	18:45	10:49 (42)	20:38	21:27	08:21 (35)	22:03	08:08 (39)
15	08:44		09:31 (46)	08:00	10:05 (42)	07:00	07:36 (47)	06:50	05:53	06:33 (39)	05:25	06:40 (39)
	17:02	42	10:35 (44)	17:57	11:23 (42)	18:47	10:44 (42)	20:40	21:29	08:21 (35)	22:03	08:09 (39)
16	08:44		09:29 (46)	07:58	10:05 (42)	06:58	07:34 (47)	06:48	05:51	06:32 (39)	05:25	06:41 (39)
	17:04	42	10:34 (44)	17:59	11:23 (42)	18:49	10:44 (42)	20:41	21:30	08:20 (35)	22:04	08:10 (39)
17	08:43		09:28 (46)	07:56	10:05 (42)	06:56	07:33 (47)	06:46	05:50	06:30 (39)	05:25	06:42 (39)
	17:06	45	10:35 (44)	18:01	11:23 (42)	18:51	10:45 (42)	20:43	21:32	08:19 (35)	22:04	08:11 (39)
18	08:42		09:27 (46)	07:54	10:04 (42)	06:53	07:33 (47)	06:44	05:48	06:29 (39)	05:25	06:43 (39)
	17:07	47	10:35 (44)	18:03	11:22 (42)	18:52	10:46 (42)	20:45	21:33	08:19 (35)	22:05	08:12 (39)
19	08:41		09:26 (46)	07:52	10:04 (42)	06:51	07:34 (47)	06:41	05:47	06:28 (39)	05:25	06:44 (39)
	17:09	50	10:36 (44)	18:05	11:22 (42)	18:54	10:47 (42)	20:46	21:35	08:18 (35)	22:05	08:13 (39)
20	08:40		09:25 (46)	07:50	10:04 (42)	06:49	07:35 (47)	06:39	05:46	06:27 (39)	05:25	06:45 (39)
	17:10	55	10:42 (42)	18:06	11:22 (42)	18:56	10:49 (42)	20:48	21:36	08:17 (35)	22:05	08:14 (39)
21	08:39		09:23 (46)	07:48	10:03 (42)	06:47	07:37 (47)	06:37	05:44	06:26 (39)	05:25	06:46 (39)
	17:12	65	10:48 (42)	18:08	11:22 (42)	18:57	10:50 (42)	20:50	21:38	08:17 (35)	22:06	08:15 (39)
22	08:38		09:22 (46)	07:46	10:02 (42)	06:44	07:35 (47)	06:35	05:43	06:25 (39)	05:26	06:47 (39)
	17:14	72	10:53 (42)	18:10	11:22 (42)	18:59	10:51 (42)	20:51	21:39	08:16 (35)	22:06	08:16 (39)
23	08:36		09:20 (46)	07:44	10:02 (42)	06:42	07:34 (47)	06:33	05:42	06:24 (39)	05:26	06:48 (39)
	17:15	76	10:55 (42)	18:12	11:22 (42)	19:01	10:53 (42)	20:53	21:40	08:15 (35)	22:06	08:17 (39)
24	08:35		09:19 (46)	07:42	10:01 (42)	06:40	07:33 (47)	06:31	05:40	06:23 (39)	05:26	06:49 (39)
	17:17	80	10:58 (42)	18:14	11:21 (42)	19:02	10:55 (42)	20:55	21:42	08:14 (35)	22:06	08:18 (39)
25	08:34		09:17 (46)	07:40	10:01 (42)	06:37	07:32 (47)	06:29	05:39	06:24 (39)	05:26	06:50 (39)
	17:19	82	11:00 (42)	18:15	11:21 (42)	19:04	10:56 (42)	20:56	21:43	08:14 (35)	22:06	08:19 (39)
26	08:33		09:16 (46)	07:38	10:01 (42)	06:35	07:32 (47)	06:27	05:38	06:23 (39)	05:27	06:51 (39)
	17:21	85	11:02 (42)	18:17	11:20 (42)	19:06	10:58 (42)	20:58	21:44	08:13 (35)	22:06	08:20 (39)
27	08:31		09:15 (46)	07:36	10:00 (42)	06:33	07:31 (47)	06:25	05:37	06:22 (39)	05:27	06:52 (39)
	17:22	88	11:04 (42)	18:19	11:20 (42)	19:08	11:00 (42)	21:00	21:46	08:12 (35)	22:06	08:21 (39)
28	08:30		09:16 (46)	07:33	10:00 (42)	06:30	07:30 (47)	06:23	05:36	06:21 (39)	05:28	06:53 (39)
	17:24	87	11:06 (42)	18:21	11:18 (42)	19:09	11:01 (42)	21:01	21:47	08:10 (35)	22:06	08:22 (39)
29	08:29		09:17 (46)			07:28	07:31 (47)	06:21	05:35	06:20 (39)	05:28	06:54 (39)
	17:26	87	11:07 (42)			20:11	11:03 (42)	21:03	21:48	08:09 (35)	22:06	06:55 (39)
30	08:27		09:17 (46)			07:26	07:30 (47)	06:19	05:34	06:20 (39)	05:29	06:56 (39)
	17:28	87	11:09 (42)			20:13	11:05 (42)	21:05	21:49	08:08 (35)	22:06	06:57 (39)
31	08:26		09:19 (46)			07:24			05:33	06:20 (39)		
	17:30	85	11:11 (42)			20:14			21:51	08:06 (35)		
Potential sun hours	260		278			367		416		484		497
Total, worst case	1844		2315			1399		1053		1803		188
Sun reduction	0,18		0,27			0,30		0,38		0,43		0,38
Oper. time red.	0,99		0,99			0,99		0,99		0,99		0,99
Wind dir. red.	0,59		0,59			0,58		0,62		0,63		0,66
Total reduction	0,11		0,16			0,17		0,23		0,26		0,25
Total, real	198		360			239		244		476		46

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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Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Licensed user:

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (32)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December							
1	05:29		06:42 (39)	06:06		06:48 (39)	06:55		07:36 (38)	07:43		08:21 (47)	07:36		09:37 (42)	08:27		09:36 (44)
	22:06	2	06:44 (39)	21:34		08:33 (35)	20:33	28	08:04 (38)	19:24	73	11:35 (42)	17:18	73	10:50 (42)	16:38	39	10:15 (44)
2	05:30		06:40 (39)	06:07		06:50 (39)	06:56		07:35 (38)	07:45		08:23 (47)	07:38		09:38 (42)	08:28		09:36 (44)
	22:05	6	06:46 (39)	21:32		08:34 (35)	20:30	28	08:03 (38)	19:21	79	11:38 (42)	17:16	71	10:49 (42)	16:38	38	10:14 (44)
3	05:31		06:40 (39)	06:09		06:51 (39)	06:58		07:37 (38)	07:46		08:25 (47)	07:40		09:38 (42)	08:30		09:37 (44)
	22:05	8	06:48 (39)	21:31		08:34 (35)	20:28	26	08:03 (38)	19:19	84	11:41 (42)	17:14	70	10:48 (42)	16:37	38	10:15 (44)
4	05:32		06:38 (39)	06:10		07:39 (35)	07:00		07:38 (38)	07:48		08:26 (47)	07:42		09:39 (42)	08:31		09:38 (44)
	22:04	10	06:48 (39)	21:29		08:34 (35)	20:26	24	08:02 (38)	19:17	88	11:42 (42)	17:13	69	10:48 (42)	16:36	45	12:58 (41)
5	05:32		06:38 (39)	06:12		07:39 (35)	07:01		07:40 (38)	07:50		08:28 (47)	07:43		09:40 (42)	08:32		09:39 (44)
	22:04	12	06:50 (39)	21:27		08:35 (35)	20:24	21	08:01 (38)	19:15	89	11:44 (42)	17:11	67	10:47 (42)	16:36	49	13:01 (41)
6	05:33		06:38 (39)	06:13		07:38 (35)	07:03		07:41 (38)	07:51		08:51 (45)	07:45		09:40 (42)	08:34		09:39 (44)
	22:03	13	06:51 (39)	21:26		08:34 (35)	20:21	18	07:59 (38)	19:12	91	11:45 (42)	17:09	66	10:46 (42)	16:35	53	13:03 (41)
7	05:34		06:37 (39)	06:15		07:39 (35)	07:04		07:43 (38)	07:53		08:50 (45)	07:47		08:55 (46)	08:35		09:39 (44)
	22:03	15	06:52 (39)	21:24		08:35 (35)	20:19	15	07:58 (38)	19:10	96	11:47 (42)	17:08	71	10:45 (42)	16:35	55	13:04 (41)
8	05:35		06:36 (39)	06:16		07:38 (35)	07:06		07:44 (38)	07:55		08:49 (45)	07:49		08:53 (46)	08:36		09:40 (44)
	22:02	16	06:52 (39)	21:22		08:35 (35)	20:17	12	07:56 (38)	19:08	98	11:47 (42)	17:06	77	10:45 (42)	16:35	57	13:06 (41)
9	05:36		06:36 (39)	06:18		07:38 (35)	07:08		07:46 (38)	07:56		08:49 (45)	07:51		08:51 (46)	08:37		09:41 (44)
	22:02	23	08:06 (35)	21:20		08:34 (35)	20:14	8	07:54 (38)	19:06	101	11:49 (42)	17:04	82	10:44 (42)	16:34	58	13:07 (41)
10	05:37		06:35 (39)	06:19		07:38 (35)	07:09		07:47 (38)	07:58		08:48 (45)	07:52		08:50 (46)	08:38		09:41 (44)
	22:01	31	08:10 (35)	21:18		08:35 (35)	20:12	2	07:49 (38)	19:03	104	11:50 (42)	17:03	84	10:43 (42)	16:34	59	13:08 (41)
11	05:38		06:35 (39)	06:21		07:38 (35)	07:11		08:00	08:48 (45)	106	11:51 (42)	17:01	86	10:42 (42)	16:34	60	13:10 (41)
	22:00	35	08:12 (35)	21:16		08:34 (35)	20:10		19:01	08:02		08:48 (45)	07:56		08:49 (46)	08:40		09:43 (44)
12	05:39		06:35 (39)	06:23		07:38 (35)	07:12		08:02	18:59	105	11:50 (42)	17:00	86	10:40 (42)	16:34	61	13:11 (41)
	21:59	40	08:14 (35)	21:15		08:34 (35)	20:08		18:59	08:03		08:48 (45)	07:58		08:48 (46)	08:41		09:44 (44)
13	05:40		06:34 (39)	06:24		07:38 (35)	07:14		08:03	18:57	107	11:51 (42)	16:58	88	10:39 (42)	16:34	61	13:12 (41)
	21:58	43	08:15 (35)	21:13		08:34 (35)	20:05		18:57	08:05		08:48 (45)	07:59		08:48 (46)	08:42		09:44 (44)
14	05:41		06:34 (39)	06:26		07:38 (35)	07:16		08:05	18:55	107	11:52 (42)	16:57	88	10:38 (42)	16:34	61	13:12 (41)
	21:58	47	08:17 (35)	21:11		08:34 (35)	20:03		18:55	08:07		08:49 (45)	08:01		08:48 (46)	08:43		09:45 (44)
15	05:42		06:34 (39)	06:27		07:38 (35)	07:17		08:07	18:52	106	11:52 (42)	16:55	88	10:37 (42)	16:34	62	13:13 (41)
	21:57	49	08:18 (35)	21:09		08:33 (35)	20:01		18:52	08:08		08:50 (45)	08:03		08:49 (46)	08:44		09:45 (44)
16	05:44		06:34 (39)	06:29		07:39 (35)	07:19		08:08	18:50	105	11:53 (42)	16:54	85	10:35 (42)	16:34	61	13:13 (41)
	21:56	53	08:20 (35)	21:07		08:33 (35)	19:58		18:50	08:10		08:51 (45)	08:05		08:51 (46)	08:45		09:46 (44)
17	05:45		06:33 (39)	06:31		07:38 (35)	07:20		08:10	18:48	103	11:53 (42)	16:52	83	10:34 (42)	16:34	61	13:14 (41)
	21:54	56	08:21 (35)	21:05		08:32 (35)	19:56		18:48	08:12		08:52 (45)	08:06		08:53 (46)	08:46		09:46 (44)
18	05:46		06:34 (39)	06:32		07:39 (35)	07:22		08:12	18:46	102	11:53 (42)	16:51	80	10:32 (42)	16:35	62	13:15 (41)
	21:53	58	08:23 (35)	21:03		08:32 (35)	19:54		18:46	08:13		08:53 (45)	08:08		08:55 (46)	08:46		09:47 (44)
19	05:47		06:34 (39)	06:34		07:39 (35)	07:24		08:13	18:44	99	11:53 (42)	16:50	76	10:30 (42)	16:35	63	13:16 (41)
	21:52	61	08:24 (35)	21:01		08:31 (35)	19:51		18:44	08:15		08:55 (45)	08:10		08:57 (46)	08:47		09:47 (44)
20	05:49		06:34 (39)	06:35		07:40 (35)	07:25		08:15	18:42	95	11:53 (42)	16:49	71	10:28 (42)	16:35	63	13:16 (41)
	21:51	63	08:25 (35)	20:59		08:30 (35)	19:49		18:42	08:17		08:58 (45)	08:11		08:59 (46)	08:48		09:48 (44)
21	05:50		06:34 (39)	06:37		07:40 (35)	07:27		08:17	18:40	89	11:53 (42)	16:48	65	10:24 (42)	16:36	62	13:17 (41)
	21:50	64	08:25 (35)	20:56		08:29 (35)	19:47		18:40	08:19		10:34 (42)	08:13		09:01 (46)	08:48		09:48 (44)
22	05:51		06:35 (39)	06:39		07:41 (35)	07:28		08:23 (47)	18:38	79	11:53 (42)	16:46	55	10:18 (42)	16:36	62	13:17 (41)
	21:49	65	08:26 (35)	20:54		08:28 (35)	19:44	7	08:30 (47)	08:20 (47)		10:34 (42)	08:15		09:02 (46)	08:49		09:49 (44)
23	05:53		06:36 (39)	06:40		07:42 (35)	07:30		08:20 (47)	18:36	79	11:53 (42)	16:45	50	10:12 (44)	16:37	63	13:18 (41)
	21:47	65	08:27 (35)	20:52		08:26 (35)	19:42	13	08:33 (47)	08:22		10:34 (42)	08:16		09:04 (46)	08:49		09:49 (44)
24	05:54		06:38 (39)	06:42		07:43 (35)	07:32		08:18 (47)	18:34	79	11:53 (42)	16:44	47	10:12 (44)	16:37	63	13:18 (41)
	21:46	65	08:28 (35)	20:50		08:25 (35)	19:40	17	08:35 (47)	07:24		09:34 (42)	08:18		09:06 (46)	08:50		09:49 (44)
25	05:55		06:39 (39)	06:43		07:42 (38)	07:33		08:16 (47)	17:32	79	10:53 (42)	16:43	46	10:13 (44)	16:38	63	13:18 (41)
	21:45	65	08:29 (35)	20:48		08:23 (35)	19:37	19	08:35 (47)	07:26		09:35 (42)	08:19		09:08 (46)	08:50		09:51 (44)
26	05:57		06:40 (39)	06:45		07:41 (38)	07:35		08:15 (47)	17:30	77	10:52 (42)	16:42	42	10:13 (44)	16:39	61	13:19 (41)
	21:43	64	08:29 (35)	20:46		08:22 (35)	19:35	21	08:36 (47)	07:27		09:35 (42)	08:21		09:10 (46)	08:50		09:51 (44)
27	05:58		06:42 (39)	06:47		07:39 (38)	07:37		08:15 (47)	17:28	77	10:52 (42)	16:41	42	10:14 (44)	16:39	62	13:19 (41)
	21:42	65	08:31 (35)	20:44		08:19 (35)	19:33	22	08:37 (47)	07:29		09:35 (42)	08:22		09:34 (44)	08:50		09:51 (44)
28	06:00		06:43 (39)	06:48		07:38 (38)	07:38		08:16 (47)	17:26	77	10:52 (42)	16:41	39	10:13 (44)	16:40	61	13:19 (41)
	21:40	64	08:31 (35)	20:41		08:17 (35)	19:31	35	11:22 (42)	07:31		09:35 (42)	08:24		09:35 (44)	08:50		09:51 (44)
29	06:01		06:44 (39)	06:50		07:37 (38)	07:40		08:18 (47)	17:24	76	10:51 (42)	16:40	39	10:14 (44)	16:41	61	13:19 (41)
	21:39	63	08:31 (35)	20:39		08:13 (35)	19:28	45	11:28 (42)	07:33		09:36 (42)	08:25		09:36 (44)	08:51		09:52 (44)
30	06:03		06:46 (39)	06:51		07:37 (38)	07:41		08:20 (47)	17:22	75	10:51 (42)	16:39	38	10:14 (44)	16:42	61	13:20 (41)
	21:37	63	08:33 (35)	20:37		08:09 (35)	19:26	63	11:33 (42)	07:35		09:36 (42)	08:26		09:36 (44)	08:51		09:52 (44)
31	06:04		06:47 (39)	06:53		07:36 (38)	07:45		08:21 (47)	17:20	74	10:50 (42)	16:38		10:14 (44)	16:43	60	13:20 (41)
	21:36	61	08:33 (35)	20:35		08:04 (38)	19:25		17:20									
Potential sun hours	501			453			381		332			267				245		
Total, worst case	1345					1549		424		2799		2024				1785		
Sun reduction	0,40					0,42		0,36		0,31		0,22				0,16		
Oper. time red.	0,99					0,99		0,99		0,99		0,99				0,99		
Wind dir. red.	0,64					0,62		0,59		0,58		0,58				0,63		
Total reduction	0,25					0,26		0,21		0,18		0,13				0,10		
Total, real	334					396		88		490		255				180		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (33)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:51		09:43 (46)	08:24		09:16 (45)	07:31		08:08 (47)	07:21		07:59 (38)	06:17		08:13 (35)	05:32		06:23 (39)
	16:44	146	14:20 (41)	17:31	86	13:42 (42)	18:23	27	09:26 (45)	20:16	29	08:28 (38)	21:06	91	09:44 (35)	21:52	104	09:31 (35)
2	08:51		09:44 (46)	08:23		09:12 (45)	07:29		08:06 (47)	07:19		07:57 (38)	06:15		08:13 (35)	05:31		06:23 (39)
	16:45	144	14:20 (41)	17:33	94	13:42 (42)	18:24	16	08:22 (47)	20:18	31	08:28 (38)	21:08	90	09:43 (35)	21:53	104	09:31 (35)
3	08:50		09:44 (46)	08:21		09:09 (45)	07:27		08:04 (47)	07:17		07:56 (38)	06:13		08:12 (35)	05:31		06:22 (39)
	16:46	144	14:20 (41)	17:35	99	13:42 (42)	18:26	19	08:23 (47)	20:19	33	08:29 (38)	21:10	91	09:43 (35)	21:54	103	09:30 (35)
4	08:50		09:44 (46)	08:20		09:07 (45)	07:25		08:01 (47)	07:14		07:56 (38)	06:11		08:13 (35)	05:30		06:23 (39)
	16:47	142	14:19 (41)	17:37	102	13:41 (42)	18:28	21	08:22 (47)	20:21	56	09:18 (35)	21:11	90	09:43 (35)	21:55	101	09:30 (35)
5	08:50		09:45 (46)	08:18		09:07 (45)	07:23		07:59 (47)	07:12		07:48 (48)	06:10		08:12 (35)	05:29		06:23 (39)
	16:48	137	14:19 (41)	17:39	103	13:42 (42)	18:30	24	08:23 (47)	20:23	71	09:23 (35)	21:13	91	09:43 (35)	21:56	100	09:29 (35)
6	08:50		09:45 (46)	08:16		09:05 (45)	07:20		07:57 (47)	07:10		07:45 (48)	06:08		08:12 (35)	05:29		06:24 (39)
	16:50	133	14:16 (41)	17:41	107	13:42 (42)	18:31	26	08:23 (47)	20:24	82	09:25 (35)	21:15	90	09:42 (35)	21:57	100	09:30 (35)
7	08:49		09:47 (46)	08:15		09:04 (45)	07:18		07:56 (47)	07:08		07:43 (48)	06:06		08:12 (35)	05:28		06:24 (39)
	16:51	125	13:30 (42)	17:42	107	13:41 (42)	18:33	26	08:22 (47)	20:26	91	09:28 (35)	21:16	90	09:42 (35)	21:58	99	09:29 (35)
8	08:49		09:47 (46)	08:13		09:03 (45)	07:16		07:56 (47)	07:05		07:41 (48)	06:04		08:12 (35)	05:28		06:24 (39)
	16:52	124	13:30 (42)	17:44	109	13:41 (42)	18:35	26	08:22 (47)	20:28	98	09:31 (35)	21:18	89	09:41 (35)	21:59	98	09:29 (35)
9	08:48		09:47 (46)	08:11		09:03 (45)	07:14		07:56 (47)	07:03		07:39 (48)	06:03		08:12 (35)	05:27		06:25 (39)
	16:54	123	13:31 (42)	17:46	108	13:40 (42)	18:37	26	08:22 (47)	20:29	105	09:33 (35)	21:19	90	09:42 (35)	21:59	97	09:29 (35)
10	08:48		09:48 (46)	08:09		09:02 (45)	07:12		07:57 (47)	07:01		07:37 (48)	06:01		08:12 (35)	05:27		06:24 (39)
	16:55	120	13:31 (42)	17:48	109	13:40 (42)	18:38	24	08:21 (47)	20:31	111	09:35 (35)	21:21	89	09:41 (35)	22:00	96	09:28 (35)
11	08:47		09:49 (46)	08:07		08:47 (15)	07:09		07:57 (47)	06:59		07:35 (48)	05:59		08:12 (35)	05:26		06:25 (39)
	16:56	120	13:33 (42)	17:50	112	13:39 (42)	18:40	22	08:19 (47)	20:33	115	09:36 (35)	21:23	89	09:41 (35)	22:01	96	09:28 (35)
12	08:47		09:50 (46)	08:06		08:45 (15)	07:07		07:58 (47)	06:57		07:32 (48)	05:58		08:12 (35)	05:26		06:26 (39)
	16:58	117	13:33 (42)	17:52	113	13:38 (42)	18:42	20	08:18 (47)	20:35	119	09:37 (35)	21:24	88	09:40 (35)	22:02	95	09:29 (35)
13	08:46		09:50 (46)	08:04		08:43 (15)	07:05		08:00 (47)	06:54		07:31 (48)	05:56		06:36 (39)	05:26		06:26 (39)
	16:59	115	13:34 (42)	17:53	114	13:37 (42)	18:44	17	08:17 (47)	20:36	119	09:38 (35)	21:26	95	09:40 (35)	22:02	95	09:29 (35)
14	08:45		09:51 (46)	08:02		08:41 (15)	07:02		08:01 (47)	06:52		07:32 (48)	05:54		06:34 (39)	05:25		06:26 (39)
	17:01	112	13:35 (42)	17:55	116	13:36 (42)	18:45	13	08:14 (47)	20:38	119	09:39 (35)	21:27	97	09:39 (35)	22:03	94	09:29 (35)
15	08:44		09:52 (46)	08:00		08:39 (15)	07:00		08:06 (47)	06:50		07:32 (48)	05:53		06:33 (39)	05:25		06:27 (39)
	17:02	107	13:36 (42)	17:57	116	13:35 (42)	18:47	3	08:09 (47)	20:40	117	09:40 (35)	21:29	100	09:39 (35)	22:03	93	09:29 (35)
16	08:44		09:53 (46)	07:58		08:37 (15)	06:58			06:48		07:34 (48)	05:51		06:32 (39)	05:25		06:27 (39)
	17:04	96	13:35 (42)	17:59	115	13:34 (42)	18:49			20:41	113	09:41 (35)	21:30	102	09:39 (35)	22:04	93	09:29 (35)
17	08:43		09:54 (46)	07:56		08:35 (15)	06:56			06:46		07:36 (48)	05:50		06:30 (39)	05:25		06:27 (39)
	17:05	92	13:36 (42)	18:01	113	13:32 (42)	18:51			20:43	106	09:42 (35)	21:32	103	09:37 (35)	22:04	93	09:29 (35)
18	08:42		09:56 (46)	07:54		08:32 (15)	06:53			06:43		08:01 (38)	05:48		06:29 (39)	05:25		06:28 (39)
	17:07	90	13:37 (42)	18:03	110	13:30 (42)	18:52			20:45	93	09:42 (35)	21:33	104	09:37 (35)	22:05	92	09:29 (35)
19	08:41		09:58 (46)	07:52		08:32 (15)	06:51			06:41		08:06 (38)	05:47		06:28 (39)	05:25		06:28 (39)
	17:09	87	13:38 (42)	18:04	105	13:27 (42)	18:54			20:46	85	09:43 (35)	21:35	106	09:37 (35)	22:05	92	09:29 (35)
20	08:40		10:01 (46)	07:50		08:33 (15)	06:49			06:39		08:21 (35)	05:46		06:27 (39)	05:25		06:28 (39)
	17:10	83	13:39 (42)	18:06	99	13:25 (42)	18:56			20:48	82	09:43 (35)	21:36	107	09:37 (35)	22:05	91	09:29 (35)
21	08:39		12:22 (42)	07:48		08:34 (15)	06:47			06:37		08:20 (35)	05:44		06:26 (39)	05:25		06:28 (39)
	17:12	76	13:38 (42)	18:08	87	13:22 (42)	18:57			20:50	84	09:44 (35)	21:38	107	09:36 (35)	22:06	91	09:29 (35)
22	08:38		12:22 (42)	07:46		08:37 (15)	06:44			06:35		08:19 (35)	05:43		06:25 (39)	05:26		06:28 (39)
	17:14	77	13:39 (42)	18:10	74	13:18 (42)	18:59			20:51	85	09:44 (35)	21:39	108	09:36 (35)	22:06	91	09:29 (35)
23	08:36		12:22 (42)	07:44		09:02 (45)	06:42			06:33		08:18 (35)	05:42		06:24 (39)	05:26		06:29 (39)
	17:15	77	13:39 (42)	18:12	50	13:11 (42)	19:01			20:53	86	09:44 (35)	21:40	109	09:35 (35)	22:06	91	09:30 (35)
24	08:35		12:22 (42)	07:42		09:02 (45)	06:40			06:31		08:17 (35)	05:40		06:22 (39)	05:26		06:29 (39)
	17:17	78	13:40 (42)	18:14	34	09:36 (45)	19:02			20:55	87	09:44 (35)	21:42	110	09:34 (35)	22:06	92	09:30 (35)
25	08:34		12:22 (42)	07:40		09:03 (45)	06:37			06:29		08:16 (35)	05:39		06:22 (39)	05:26		06:28 (39)
	17:19	78	13:40 (42)	18:15	32	09:35 (45)	19:04			20:56	88	09:44 (35)	21:43	109	09:34 (35)	22:06	93	09:30 (35)
26	08:33		12:23 (42)	07:38		09:05 (45)	06:35			06:27		08:16 (35)	05:38		06:23 (39)	05:27		06:29 (39)
	17:21	78	13:41 (42)	18:17	29	09:34 (45)	19:06			20:58	88	09:44 (35)	21:44	108	09:34 (35)	22:06	93	09:31 (35)
27	08:31		12:22 (42)	07:36		08:13 (47)	06:33		07:12 (38)	06:25		08:15 (35)	05:37		06:22 (39)	05:27		06:29 (39)
	17:22	79	13:41 (42)	18:19	30	09:32 (45)	19:08	5	07:17 (38)	21:00	89	09:44 (35)	21:46	110	09:34 (35)	22:06	93	09:31 (35)
28	08:30		12:23 (42)	07:33		08:10 (47)	06:30		07:07 (38)	06:23		08:14 (35)	05:36		06:22 (39)	05:28		06:30 (39)
	17:24	79	13:42 (42)	18:21	30	09:29 (45)	19:09	15	07:22 (38)	21:01	90	09:44 (35)	21:47	108	09:33 (35)	22:06	93	09:32 (35)
29	08:29		12:23 (42)				07:28		08:04 (38)	06:21		08:15 (35)	05:35		06:22 (39)	05:28		06:29 (39)
	17:26	78	13:41 (42)				20:11	21	08:25 (38)	21:03	90	09:45 (35)	21:48	107	09:32 (35)	22:06	94	09:32 (35)
30	08:27		12:23 (42)				07:26		08:02 (38)	06:19		08:14 (35)	05:34		06:22 (39)	05:29		06:30 (39)
	17:28	78	13:41 (42)				20:13	24	08:26 (38)	21:05	90	09:44 (35)	21:49	107	09:32 (35)	22:06	95	09:33 (35)
31	08:26		12:24 (42)				07:24		08:00 (38)				05:33		06:22 (39)			
	17:30	78	13:42 (42)				20:14	27	08:27 (38)				21:51	105	09:31 (35)			
Potential sun hours	260			278			367			416			484			497		
Total, worst case		3213			2503			402			2652			3080			2862	
Sun reduction		0,18			0,27			0,30			0,38			0,43			0,38	
Oper. time red.		0,99			0,99			0,99			0,99			0,99			0,99	
Wind dir. red.		0,67			0,63			0,56			0,59			0,60			0,61	
Total reduction		0,12			0,17			0,17			0,23			0,26			0,23	
Total, real		395			428			68			605			793			671	

Project:

Alternatief 4: Grote wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:28/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (33)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:29 (39)	06:06	08:22 (35)	06:55	07:34 (48)	07:43	08:37 (47)	07:36	08:32 (45)	08:27
	22:05	96	09:33 (35)	21:34	09:51 (35)	20:33	09:35 (35)	19:24	08:57 (47)	17:18	13:09 (42)	16:38
2	05:30		06:30 (39)	06:07	08:23 (35)	06:56	07:35 (48)	07:45	08:36 (47)	07:38	08:32 (45)	08:28
	22:05	95	09:33 (35)	21:32	09:51 (35)	20:30	09:33 (35)	19:21	08:58 (47)	17:16	13:10 (42)	16:38
3	05:31		06:30 (39)	06:09	08:22 (35)	06:58	07:37 (48)	07:46	08:35 (47)	07:40	08:33 (45)	08:30
	22:05	97	09:34 (35)	21:31	09:51 (35)	20:28	09:31 (35)	19:19	08:59 (47)	17:14	13:10 (42)	16:37
4	05:32		06:29 (39)	06:10	08:22 (35)	07:00	07:38 (48)	07:48	08:33 (47)	07:42	08:34 (45)	08:31
	22:04	98	09:34 (35)	21:29	09:51 (35)	20:26	09:28 (35)	19:17	08:58 (47)	17:13	13:11 (42)	16:36
5	05:32		06:30 (39)	06:12	08:22 (35)	07:01	07:40 (48)	07:50	08:33 (47)	07:43	08:35 (45)	08:32
	22:04	98	09:35 (35)	21:27	09:52 (35)	20:24	09:26 (35)	19:15	08:59 (47)	17:11	13:11 (42)	16:36
6	05:33		06:30 (39)	06:13	08:22 (35)	07:03	07:41 (48)	07:51	08:33 (47)	07:45	08:37 (45)	08:34
	22:03	100	09:36 (35)	21:26	09:52 (35)	20:21	09:22 (35)	19:12	08:59 (47)	17:09	13:12 (42)	16:35
7	05:34		06:30 (39)	06:15	08:22 (35)	07:04	07:43 (48)	07:53	08:33 (47)	07:47	08:38 (45)	08:35
	22:03	101	09:37 (35)	21:24	09:53 (35)	20:19	09:18 (35)	19:10	08:59 (47)	17:08	13:12 (42)	16:35
8	05:35		06:30 (39)	06:16	08:22 (35)	07:06	07:44 (48)	07:55	08:33 (47)	07:49	08:40 (45)	08:36
	22:02	101	09:36 (35)	21:22	09:52 (35)	20:17	09:13 (35)	19:08	08:58 (47)	17:06	13:12 (42)	16:35
9	05:36		06:30 (39)	06:18	08:21 (35)	07:08	07:50 (38)	07:56	08:35 (47)	07:51	08:43 (45)	08:37
	22:02	102	09:37 (35)	21:20	09:52 (35)	20:14	09:03 (35)	19:06	08:58 (47)	17:04	13:13 (42)	16:34
10	05:37		06:30 (39)	06:19	08:22 (35)	07:09	07:50 (38)	07:58	08:37 (47)	07:52	08:47 (45)	08:38
	22:01	103	09:38 (35)	21:18	09:52 (35)	20:12	08:21 (38)	19:03	08:57 (47)	17:03	13:13 (42)	16:34
11	05:38		06:30 (39)	06:21	08:21 (35)	07:11	07:51 (38)	08:00	08:39 (47)	07:54	11:55 (42)	08:39
	22:00	105	09:39 (35)	21:16	09:52 (35)	20:10	08:21 (38)	19:01	08:56 (47)	17:01	13:13 (42)	16:34
12	05:39		06:30 (39)	06:23	08:22 (35)	07:12	07:52 (38)	08:01	08:40 (47)	07:56	11:55 (42)	08:40
	21:59	105	09:39 (35)	21:15	09:52 (35)	20:08	08:20 (38)	18:59	09:56 (45)	17:00	13:13 (42)	16:34
13	05:40		06:30 (39)	06:24	08:22 (35)	07:14	07:53 (38)	08:03	08:42 (47)	07:58	11:55 (42)	08:41
	21:58	106	09:40 (35)	21:13	09:52 (35)	20:05	08:17 (38)	18:57	10:00 (45)	16:58	13:13 (42)	16:34
14	05:41		06:31 (39)	06:26	08:22 (35)	07:16	07:54 (38)	08:05	08:44 (47)	07:59	11:55 (42)	08:42
	21:57	107	09:41 (35)	21:11	09:52 (35)	20:03	08:16 (38)	18:55	10:03 (45)	16:57	13:14 (42)	16:34
15	05:42		06:31 (39)	06:27	08:22 (35)	07:17	07:56 (38)	08:07	08:46 (47)	08:01	11:55 (42)	08:43
	21:57	107	09:41 (35)	21:09	09:51 (35)	20:01	08:12 (38)	18:52	10:05 (45)	16:55	13:14 (42)	16:34
16	05:44		06:31 (39)	06:29	08:23 (35)	07:19	08:00 (38)	08:08	09:36 (45)	08:03	11:56 (42)	08:44
	21:56	108	09:42 (35)	21:07	09:52 (35)	19:58	08:08 (38)	18:50	10:07 (45)	16:54	13:14 (42)	16:34
17	05:45		06:31 (39)	06:31	08:22 (35)	07:20	08:10	08:10	09:35 (45)	08:05	11:56 (42)	08:45
	21:54	108	09:42 (35)	21:05	09:51 (35)	19:56	08:18	08:18	10:08 (45)	16:52	13:14 (42)	16:34
18	05:46		06:32 (39)	06:32	08:23 (35)	07:22	08:12	08:12	09:33 (45)	08:06	11:56 (42)	08:46
	21:53	110	09:44 (35)	21:03	09:51 (35)	19:54	08:16	08:16	10:08 (45)	16:51	13:14 (42)	16:35
19	05:47		06:32 (39)	06:34	08:23 (35)	07:24	08:13	08:13	09:32 (45)	08:08	11:57 (42)	08:46
	21:52	110	09:44 (35)	21:01	09:50 (35)	19:51	08:14	08:14	13:44 (42)	16:50	13:14 (42)	16:35
20	05:49		06:33 (39)	06:35	08:24 (35)	07:25	08:15	08:15	09:06 (45)	08:10	11:57 (42)	08:47
	21:51	109	09:45 (35)	20:58	09:50 (35)	19:49	08:16	08:16	13:50 (42)	16:49	13:14 (42)	16:35
21	05:50		06:34 (39)	06:37	08:24 (35)	07:27	08:17	08:17	09:04 (45)	08:11	11:58 (42)	08:48
	21:50	109	09:45 (35)	20:56	09:48 (35)	19:47	08:18	08:18	13:53 (42)	16:47	13:14 (42)	16:36
22	05:51		06:35 (39)	06:39	08:24 (35)	07:28	08:19	08:19	09:03 (45)	08:13	09:37 (46)	08:48
	21:49	108	09:46 (35)	20:54	09:48 (35)	19:44	08:20	08:20	13:56 (42)	16:46	13:15 (42)	16:36
23	05:53		06:36 (39)	06:40	08:24 (35)	07:30	08:20	08:20	09:02 (45)	08:15	09:34 (46)	08:49
	21:47	107	09:46 (35)	20:52	09:47 (35)	19:42	08:22	08:22	13:59 (42)	16:45	13:14 (42)	16:37
24	05:54		06:38 (39)	06:42	08:08 (38)	07:32	08:22	08:22	09:03 (45)	08:16	09:33 (46)	08:49
	21:46	106	09:47 (35)	20:50	09:46 (35)	19:40	08:24	08:24	14:00 (42)	16:44	13:14 (42)	16:37
25	05:55		06:39 (39)	06:43	08:03 (38)	07:33	08:24	08:24	08:05 (45)	08:18	09:32 (46)	08:50
	21:45	105	09:48 (35)	20:48	09:45 (35)	19:37	08:25	08:25	13:02 (42)	16:43	13:14 (42)	16:38
26	05:57		06:40 (39)	06:45	07:38 (48)	07:35	08:26	08:26	08:07 (45)	08:19	09:32 (46)	08:50
	21:43	104	09:48 (35)	20:46	09:44 (35)	19:35	08:27	08:27	13:04 (42)	16:42	13:14 (42)	16:39
27	05:58		06:42 (39)	06:47	07:35 (48)	07:37	08:27	08:27	08:09 (45)	08:21	09:31 (46)	08:50
	21:42	102	09:49 (35)	20:44	09:43 (35)	19:33	08:28	08:28	13:05 (42)	16:41	13:15 (42)	16:39
28	06:00		06:43 (39)	06:48	07:34 (48)	07:38	08:29	08:29	08:11 (45)	08:22	09:30 (46)	08:50
	21:40	101	09:49 (35)	20:41	09:42 (35)	19:31	08:30	08:30	13:06 (42)	16:40	13:14 (42)	16:40
29	06:01		06:44 (39)	06:50	07:32 (48)	07:40	08:31	08:31	08:13 (45)	08:24	09:31 (46)	08:50
	21:39	98	09:49 (35)	20:39	09:40 (35)	19:28	08:32	08:32	13:07 (42)	16:40	13:14 (42)	16:41
30	06:03		06:46 (39)	06:51	07:32 (48)	07:41	08:33	08:33	08:15 (45)	08:25	09:31 (46)	08:51
	21:37	96	09:50 (35)	20:37	09:39 (35)	19:26	08:34	08:34	13:08 (42)	16:39	13:15 (42)	16:42
31	06:04		06:47 (39)	06:53	07:32 (48)	07:42	08:35	08:35	08:17 (45)	08:26	08:51	09:43 (46)
	21:36	92	09:50 (35)	20:35	09:37 (35)	19:24	08:36	08:36	13:09 (42)	16:38	13:16 (42)	16:43
Potential sun hours	501		453		381		332		267		245	
Total, worst case		3194		2915		959		1809		2771		4461
Sun reduction		0,40		0,42		0,36		0,31		0,22		0,16
Oper. time red.		0,99		0,99		0,99		0,99		0,99		0,99
Wind dir. red.		0,61		0,59		0,60		0,61		0,67		0,66
Total reduction		0,24		0,25		0,21		0,19		0,15		0,11
Total, real		773		727		206		336		407		477

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 5: Wolk overnachtingsplaatsen

Printed/Page

17-03-2014 15:09 / 1

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:40 (9)	08:24	09:06 (8)	07:31	08:08 (11)	07:21	18:29 (1)	06:17	06:55 (13)	05:32
	16:44	86	15:51 (2)	17:31	09:32 (8)	18:23	08:20 (11)	20:16	19:22 (1)	21:06	07:28 (10)	21:52
2	08:51		09:40 (9)	08:23	09:04 (8)	07:29	08:06 (11)	07:19	07:54 (16)	06:15	06:53 (13)	05:32
	16:45	86	15:52 (2)	17:33	09:32 (8)	18:24	08:20 (11)	20:18	19:21 (1)	21:08	07:26 (10)	21:53
3	08:50		09:40 (9)	08:21	09:02 (8)	07:27	08:04 (11)	07:17	07:52 (16)	06:13	06:51 (13)	05:31
	16:46	89	15:54 (2)	17:35	09:32 (8)	18:26	08:19 (11)	20:19	19:20 (1)	21:10	07:25 (10)	21:54
4	08:50		09:39 (9)	08:19	09:00 (8)	07:25	08:01 (11)	07:14	07:50 (16)	06:11	06:50 (7)	05:30
	16:47	89	15:55 (2)	17:37	09:32 (8)	18:28	08:18 (11)	20:21	19:19 (1)	21:11	07:24 (10)	21:55
5	08:50		09:39 (9)	08:18	08:59 (8)	07:23	07:59 (11)	07:12	07:48 (16)	06:10	06:48 (7)	05:29
	16:49	89	15:56 (2)	17:39	09:34 (8)	18:30	08:17 (11)	20:23	19:19 (1)	21:13	07:22 (10)	21:56
6	08:50		09:38 (9)	08:16	08:57 (8)	07:20	07:59 (11)	07:10	07:45 (16)	06:08	06:46 (7)	05:29
	16:50	90	15:57 (2)	17:41	09:34 (8)	18:31	08:16 (11)	20:24	19:17 (1)	21:15	07:20 (10)	21:57
7	08:49		09:37 (9)	08:14	08:55 (8)	07:18	08:00 (11)	07:08	18:31 (1)	06:06	06:45 (7)	05:28
	16:51	90	15:57 (2)	17:42	09:33 (8)	18:33	08:13 (11)	20:26	19:16 (1)	21:16	07:18 (10)	21:58
8	08:49		09:37 (9)	08:13	08:55 (8)	07:16	08:04 (11)	07:05	18:32 (1)	06:04	06:43 (7)	05:28
	16:52	89	15:58 (2)	17:44	09:33 (8)	18:35	08:08 (11)	20:28	19:15 (1)	21:18	07:14 (7)	21:58
9	08:48		09:36 (9)	08:11	08:51 (14)	07:14		07:03	18:34 (1)	06:03	06:42 (7)	05:27
	16:54	90	15:59 (2)	17:46	09:33 (8)	18:37		20:29	19:13 (1)	21:19	07:16 (7)	21:59
10	08:48		09:35 (9)	08:09	08:49 (14)	07:12		07:01	18:35 (1)	06:01	06:40 (7)	05:27
	16:55	88	15:59 (2)	17:48	09:33 (8)	18:38		20:31	19:12 (1)	21:21	07:17 (7)	22:00
11	08:47		09:34 (9)	08:07	08:47 (14)	07:09	17:59 (1)	06:59	18:37 (1)	05:59	06:39 (7)	05:26
	16:56	86	15:59 (2)	17:50	09:32 (8)	18:40	18:01 (1)	20:33	19:10 (1)	21:23	07:18 (7)	22:01
12	08:47		09:34 (9)	08:06	08:45 (14)	07:07	17:52 (1)	06:57	18:38 (1)	05:58	06:37 (7)	05:26
	16:58	85	16:00 (2)	17:52	09:32 (8)	18:42	18:03 (1)	20:34	19:07 (1)	21:24	07:19 (7)	22:02
13	08:46		09:33 (9)	08:04	08:43 (14)	07:05	17:48 (1)	06:54	18:40 (1)	05:56	06:36 (7)	05:26
	16:59	81	16:00 (2)	17:54	09:31 (8)	18:44	18:06 (1)	20:36	19:04 (1)	21:26	07:20 (7)	22:02
14	08:45		09:32 (9)	08:02	08:41 (14)	07:02	17:45 (1)	06:52	18:44 (1)	05:54	06:34 (7)	05:26
	17:01	78	16:00 (2)	17:55	09:30 (8)	18:45	18:07 (1)	20:38	19:01 (1)	21:27	07:20 (7)	22:03
15	08:44		09:31 (9)	08:00	09:00 (8)	07:00	17:43 (1)	06:50	07:26 (10)	05:53	06:33 (7)	05:25
	17:02	73	16:01 (2)	17:57	09:29 (8)	18:47	18:09 (1)	20:40	07:27 (10)	21:29	07:22 (7)	22:03
16	08:44		09:30 (9)	07:58	09:01 (8)	06:58	17:41 (1)	06:48	07:24 (10)	05:51	06:32 (7)	05:25
	17:04	58	16:00 (2)	17:59	09:28 (8)	18:49	18:11 (1)	20:41	07:28 (10)	21:30	07:23 (7)	22:04
17	08:43		09:31 (9)	07:56	09:03 (8)	06:56	17:39 (1)	06:46	07:22 (10)	05:50	06:31 (7)	05:25
	17:06	56	16:00 (2)	18:01	09:26 (8)	18:51	18:12 (1)	20:43	07:29 (10)	21:32	07:24 (7)	22:04
18	08:42		09:33 (9)	07:54	09:04 (8)	06:53	17:37 (1)	06:44	07:20 (10)	05:48	06:29 (7)	05:25
	17:07	53	16:00 (2)	18:03	09:23 (8)	18:52	18:14 (1)	20:45	07:30 (10)	21:33	07:24 (7)	22:05
19	08:41		09:34 (9)	07:52	09:07 (8)	06:51	17:36 (1)	06:41	07:18 (10)	05:47	06:28 (7)	05:25
	17:09	50	16:00 (2)	18:05	09:20 (8)	18:54	18:16 (1)	20:46	07:31 (10)	21:35	07:24 (7)	22:05
20	08:40		09:36 (9)	07:50		06:49	17:34 (1)	06:39	07:16 (10)	05:46	06:27 (7)	05:25
	17:10	45	15:59 (2)	18:06		18:56	18:17 (1)	20:48	07:31 (10)	21:36	07:25 (7)	22:05
21	08:39		09:39 (9)	07:48		06:47	17:34 (1)	06:37	07:14 (10)	05:44	06:26 (7)	05:25
	17:12	40	16:00 (2)	18:08		18:57	18:19 (1)	20:50	07:31 (10)	21:38	07:26 (7)	22:06
22	08:38		15:27 (2)	07:46		06:44	17:33 (1)	06:35	07:12 (10)	05:43	06:26 (7)	05:26
	17:14	33	16:00 (2)	18:10		18:59	18:21 (1)	20:51	07:32 (10)	21:39	07:26 (7)	22:06
23	08:36		09:20 (8)	07:44		06:42	17:32 (1)	06:33	07:10 (10)	05:42	06:26 (7)	05:26
	17:16	32	15:58 (2)	18:12		19:01	18:22 (1)	20:53	07:32 (10)	21:40	07:27 (7)	22:06
24	08:35		09:19 (8)	07:42		06:40	17:31 (1)	06:31	07:08 (10)	05:41	06:25 (7)	05:26
	17:17	33	15:58 (2)	18:14		19:02	18:24 (1)	20:55	07:31 (10)	21:42	07:27 (7)	22:06
25	08:34		09:17 (8)	07:40	08:17 (11)	06:37	17:31 (1)	06:29	07:06 (10)	05:39	06:25 (7)	05:26
	17:19	34	15:57 (2)	18:15	08:20 (11)	19:04	18:24 (1)	20:56	07:31 (10)	21:43	07:27 (7)	22:06
26	08:33		09:16 (8)	07:38	08:15 (11)	06:35	17:30 (1)	06:27	07:04 (10)	05:38	06:25 (7)	05:27
	17:21	34	15:56 (2)	18:17	08:20 (11)	19:06	18:24 (1)	20:58	07:31 (10)	21:44	07:28 (7)	22:06
27	08:31		09:14 (8)	07:36	08:13 (11)	06:33	17:29 (1)	06:25	07:02 (10)	05:37	06:25 (7)	05:27
	17:22	35	15:55 (2)	18:19	08:21 (11)	19:08	18:24 (1)	21:00	07:30 (10)	21:46	07:28 (7)	22:06
28	08:30		09:13 (8)	07:33	08:10 (11)	06:30	17:29 (1)	06:23	07:00 (10)	05:36	06:25 (7)	05:28
	17:24	32	15:53 (2)	18:21	08:20 (11)	19:09	18:24 (1)	21:01	07:29 (10)	21:47	07:28 (7)	22:06
29	08:29		09:11 (8)			07:28	18:29 (1)	06:21	06:59 (10)	05:35	06:24 (7)	05:28
	17:26	28	15:50 (2)			20:11	19:24 (1)	21:03	07:30 (10)	21:48	07:28 (7)	22:06
30	08:27		09:09 (8)			07:26	18:29 (1)	06:19	06:57 (13)	05:34	06:24 (7)	05:29
	17:28	21	09:30 (8)			20:13	19:23 (1)	21:05	07:29 (10)	21:49	07:28 (7)	22:06
31	08:26		09:08 (8)			07:24	18:29 (1)			05:33	06:24 (7)	
	17:30	24	09:32 (8)			20:14	19:22 (1)			21:50	07:28 (7)	
Potential sun hours	260		278			367		416		484		497
Total, worst case	1897		639			947		888		1515		1969
Sun reduction	0,18		0,27			0,30		0,38		0,43		0,38
Oper. time red.	0,97		0,97			0,97		0,97		0,97		0,97
Wind dir. red.	0,66		0,56			0,61		0,62		0,66		0,66
Total reduction	0,12		0,15			0,18		0,23		0,27		0,25
Total, real	224		95			170		206		415		484

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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Project:

Alternatief 5: Wolk overnachtingsplaatsen

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17-03-2014 15:09 / 2

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:29 (7)	06:06	06:48 (7)	06:55	18:36 (1)	07:43	18:29 (1)	07:36	08:19 (14)	08:27
	22:05	66	07:35 (7)	21:34	07:29 (7)	20:33	19:09 (1)	19:24	18:43 (1)	17:18	09:02 (8)	16:38
2	05:30		06:30 (7)	06:07	06:50 (7)	06:56	18:33 (1)	07:45	18:34 (1)	07:38	08:21 (14)	08:28
	22:05	66	07:36 (7)	21:32	07:28 (7)	20:30	19:10 (1)	19:21	18:41 (1)	17:16	09:03 (8)	16:38
3	05:31		06:31 (7)	06:09	06:51 (7)	06:58	18:32 (1)	07:46		07:40	08:25 (8)	08:30
	22:05	65	07:36 (7)	21:31	07:27 (7)	20:28	19:11 (1)	19:19		17:14	09:03 (8)	16:37
4	05:32		06:30 (7)	06:10	06:52 (7)	07:00	18:29 (1)	07:48		07:42	08:25 (8)	08:31
	22:04	66	07:36 (7)	21:29	07:25 (7)	20:26	19:12 (1)	19:17		17:13	09:03 (8)	16:36
5	05:32		06:31 (7)	06:12	06:54 (7)	07:01	18:28 (1)	07:50		07:43	08:27 (8)	08:32
	22:04	65	07:36 (7)	21:27	07:24 (7)	20:24	19:13 (1)	19:15		17:11	09:03 (8)	16:36
6	05:33		06:31 (7)	06:13	06:55 (7)	07:03	18:26 (1)	07:51	08:38 (11)	07:45	08:29 (8)	08:34
	22:03	65	07:36 (7)	21:26	07:28 (10)	20:21	19:13 (1)	19:12	10	08:48 (11)	09:03 (8)	16:36
7	05:34		06:31 (7)	06:15	06:57 (7)	07:04	07:43 (16)	07:53	08:36 (11)	07:47	08:31 (8)	08:35
	22:03	66	07:37 (7)	21:24	07:31 (10)	20:19	19:14 (1)	19:10	15	08:51 (11)	09:03 (8)	16:35
8	05:35		06:32 (7)	06:16	06:58 (7)	07:06	07:44 (16)	07:55	08:33 (11)	07:49	08:33 (8)	08:36
	22:02	65	07:37 (7)	21:22	07:32 (10)	20:17	19:14 (1)	19:08	18	08:51 (11)	09:03 (8)	16:35
9	05:36		06:31 (7)	06:18	07:00 (7)	07:08	07:46 (16)	07:56	08:35 (11)	07:51	08:35 (8)	08:37
	22:02	65	07:36 (7)	21:20	07:34 (10)	20:14	19:14 (1)	19:06	17	08:52 (11)	09:03 (8)	16:35
10	05:37		06:31 (7)	06:19	07:01 (13)	07:09	07:47 (16)	07:58	08:37 (11)	07:52	08:37 (8)	08:38
	22:01	65	07:36 (7)	21:18	07:35 (10)	20:12	19:14 (1)	19:03	16	08:53 (11)	09:03 (8)	16:34
11	05:38		06:32 (7)	06:21	07:02 (13)	07:11	18:21 (1)	08:00	08:39 (11)	07:54	08:39 (8)	08:39
	22:00	65	07:37 (7)	21:16	07:35 (10)	20:10	19:14 (1)	19:01	15	08:54 (11)	09:02 (8)	16:34
12	05:39		06:32 (7)	06:23	07:04 (13)	07:12	18:21 (1)	08:01	08:40 (11)	07:56	08:41 (8)	08:40
	21:59	65	07:37 (7)	21:14	07:36 (10)	20:08	19:15 (1)	18:59	13	08:53 (11)	09:02 (8)	16:34
13	05:40		06:32 (7)	06:24	07:05 (13)	07:14	18:20 (1)	08:03	08:42 (11)	07:58	08:43 (8)	08:41
	21:58	65	07:37 (7)	21:13	07:36 (10)	20:05	19:14 (1)	18:57	11	08:53 (11)	15:22 (2)	16:34
14	05:41		06:33 (7)	06:26	07:07 (10)	07:16	18:20 (1)	08:05	08:44 (11)	07:59	08:45 (8)	08:42
	21:57	64	07:37 (7)	21:11	07:37 (10)	20:03	19:14 (1)	18:55	9	08:53 (11)	15:25 (2)	16:34
15	05:42		06:33 (7)	06:27	07:08 (10)	07:17	18:19 (1)	08:07	08:46 (11)	08:01	08:47 (8)	08:43
	21:56	64	07:37 (7)	21:09	07:37 (10)	20:01	19:13 (1)	18:52	7	08:53 (11)	15:28 (2)	16:34
16	05:44		06:33 (7)	06:29	07:10 (10)	07:19	18:19 (1)	08:08	08:48 (11)	08:03	08:49 (8)	08:44
	21:55	63	07:36 (7)	21:07	07:38 (10)	19:58	19:13 (1)	18:50	4	08:52 (11)	15:29 (2)	16:34
17	05:45		06:33 (7)	06:31	07:11 (10)	07:20	18:18 (1)	08:10	08:50 (11)	08:04	08:51 (8)	08:45
	21:54	63	07:36 (7)	21:05	07:37 (10)	19:56	19:12 (1)	18:48	2	08:52 (11)	15:31 (2)	16:34
18	05:46		06:35 (7)	06:32	07:13 (10)	07:22	18:18 (1)	08:12		08:06	08:53 (8)	08:46
	21:53	62	07:37 (7)	21:03	07:38 (10)	19:54	19:12 (1)	18:46		16:51	15:32 (2)	16:35
19	05:47		06:35 (7)	06:34	07:14 (10)	07:24	18:19 (1)	08:13		08:08	08:55 (8)	08:46
	21:52	62	07:37 (7)	21:01	07:37 (10)	19:51	19:12 (1)	18:44		16:50	15:33 (2)	16:35
20	05:49		06:35 (7)	06:35	07:16 (10)	07:25	18:18 (1)	08:15		08:10	15:02 (2)	16:37
	21:51	61	07:36 (7)	20:58	07:37 (10)	19:49	19:09 (1)	18:42		16:49	15:35 (2)	16:35
21	05:50		06:35 (7)	06:37	07:17 (10)	07:27	18:18 (1)	08:17		08:11	09:15 (9)	08:48
	21:50	61	07:36 (7)	20:56	07:36 (10)	19:47	19:07 (1)	18:40		16:48	15:36 (2)	16:36
22	05:51		06:35 (7)	06:39	07:19 (10)	07:28	18:18 (1)	08:19	09:43 (8)	08:13	09:13 (9)	08:48
	21:49	60	07:35 (7)	20:54	07:36 (10)	19:44	19:04 (1)	18:38	2	09:45 (8)	15:36 (2)	16:36
23	05:53		06:36 (7)	06:40	07:20 (10)	07:30	18:19 (1)	08:20	09:37 (8)	08:15	09:11 (9)	08:49
	21:47	59	07:35 (7)	20:52	07:35 (10)	19:42	19:02 (1)	18:36	14	09:51 (8)	15:36 (2)	16:37
24	05:54		06:38 (7)	06:42	07:22 (10)	07:32	18:20 (1)	08:22	09:34 (8)	08:16	09:10 (9)	08:49
	21:46	57	07:35 (7)	20:50	07:34 (10)	19:40	19:00 (1)	18:34	20	09:54 (8)	15:37 (2)	16:37
25	05:55		06:39 (7)	06:43	07:23 (10)	07:33	18:20 (1)	07:24		08:32 (8)	09:09 (9)	08:49
	21:45	56	07:35 (7)	20:48	07:33 (10)	19:37	18:57 (1)	17:32	24	08:56 (8)	15:38 (2)	16:38
26	05:57		06:40 (7)	06:45	07:25 (10)	07:35	18:21 (1)	07:26		08:30 (8)	09:09 (9)	08:50
	21:43	54	07:34 (7)	20:46	07:32 (10)	19:35	18:55 (1)	17:30	28	08:58 (8)	15:39 (2)	16:39
27	05:58		06:42 (7)	06:47	07:26 (10)	07:37	18:21 (1)	07:27		08:10 (14)	09:10 (9)	08:50
	21:42	52	07:34 (7)	20:44	07:30 (10)	19:33	18:52 (1)	17:28	35	08:59 (8)	15:40 (2)	16:39
28	06:00		06:43 (7)	06:48	18:52 (1)	07:38	18:23 (1)	07:29		08:11 (14)	09:11 (9)	08:50
	21:40	50	07:33 (7)	20:41	18:56 (1)	19:31	18:50 (1)	17:26	39	09:00 (8)	15:40 (2)	16:40
29	06:01		06:44 (7)	06:50	18:44 (1)	07:40	18:25 (1)	07:31		08:13 (14)	09:13 (9)	08:50
	21:39	48	07:32 (7)	20:39	19:02 (1)	19:28	18:48 (1)	17:24	40	09:01 (8)	15:40 (2)	16:41
30	06:03		06:46 (7)	06:51	18:41 (1)	07:41	18:26 (1)	07:33		08:15 (14)	09:15 (9)	08:51
	21:37	46	07:32 (7)	20:37	19:05 (1)	19:26	18:45 (1)	17:22	40	09:01 (8)	15:41 (2)	16:42
31	06:04		06:47 (7)	06:53	18:38 (1)			07:35		08:17 (14)		08:51
	21:36	43	07:30 (7)	20:35	19:07 (1)			17:20	40	09:02 (8)		16:43
Potential sun hours	501		453		381		332		267		245	
Total, worst case	1874		783		1342		440		1263		2637	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,97		0,97		0,97		0,97		0,97		0,97	
Wind dir. red.	0,66		0,63		0,62		0,56		0,63		0,66	
Total reduction	0,26		0,26		0,22		0,17		0,14		0,10	
Total, real	479		204		290		74		171		276	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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17-03-2014 15:09 / 3

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January		February		March		April		May		June	
1	08:51		09:44 (6)	08:24		07:31	08:34 (5)	07:21	07:57 (8)	06:17	09:32 (5)	05:32
	16:44	115	14:09 (3)	17:31		18:23	17:41 (2)	20:16	11:03 (5)	21:06	10:07 (5)	21:52
2	08:50		09:44 (6)	08:23		07:29	08:33 (5)	07:19	07:54 (8)	06:15	09:35 (5)	05:32
	16:45	115	14:09 (3)	17:33		18:24	17:42 (2)	20:18	11:02 (5)	21:08	10:03 (5)	21:53
3	08:50		09:45 (6)	08:21		09:02 (12)	08:32 (5)	07:17	07:52 (11)	06:13	09:40 (5)	05:31
	16:46	114	14:10 (3)	17:35	2	09:03 (12)	17:43 (2)	20:19	11:01 (5)	21:10	09:58 (5)	21:54
4	08:50		09:45 (6)	08:19		09:00 (12)	08:29 (5)	07:14	07:50 (11)	06:11		05:30
	16:47	114	14:10 (3)	17:37	3	09:03 (12)	17:42 (2)	20:21	11:00 (5)	21:11		21:55
5	08:50		09:46 (6)	08:18		08:59 (12)	08:28 (5)	07:12	07:48 (11)	06:10		05:29
	16:49	114	14:11 (3)	17:39	4	09:03 (12)	17:43 (2)	20:23	10:59 (5)	21:13	2	06:13 (10)
6	08:50		09:46 (6)	08:16		08:57 (12)	08:27 (5)	07:10	07:45 (11)	06:08		05:29
	16:50	113	14:10 (3)	17:41	5	09:02 (12)	17:43 (2)	20:24	10:57 (5)	21:14	2	06:15 (10)
7	08:49		09:46 (6)	08:14		08:55 (12)	07:54 (14)	07:08	07:43 (11)	06:06		05:28
	16:51	113	14:10 (3)	17:42	6	09:01 (12)	17:43 (2)	20:26	10:56 (5)	21:16	3	06:16 (10)
8	08:49		09:47 (6)	08:13		08:53 (12)	07:52 (14)	07:05	07:42 (11)	06:04		05:28
	16:52	113	14:11 (3)	17:44	6	08:59 (12)	17:43 (2)	20:28	10:55 (5)	21:18	4	06:16 (10)
9	08:48		09:47 (6)	08:11		07:14	07:50 (14)	07:03	07:44 (11)	06:03		05:27
	16:54	112	14:11 (3)	17:46		18:37	17:43 (2)	20:29	10:54 (5)	21:19	5	06:17 (10)
10	08:48		09:47 (6)	08:09		07:12	07:48 (14)	07:01	07:49 (11)	06:01		05:27
	16:55	112	14:11 (3)	17:48		18:38	17:43 (2)	20:31	10:53 (5)	21:21	5	06:16 (10)
11	08:47		09:48 (6)	08:07		07:09	07:45 (14)	06:59	07:59 (8)	05:59		05:26
	16:56	111	14:11 (3)	17:50		18:40	17:42 (2)	20:33	10:52 (5)	21:23	6	06:17 (10)
12	08:47		09:49 (6)	08:06		08:45 (9)	07:43 (14)	06:57	08:00 (8)	05:58		05:26
	16:58	110	14:12 (3)	17:52	2	08:47 (9)	17:42 (2)	20:34	10:49 (5)	21:24	6	06:17 (10)
13	08:46		09:50 (6)	08:04		08:43 (9)	07:45 (14)	06:54	08:02 (8)	05:56		05:26
	16:59	109	14:12 (3)	17:54	5	08:48 (9)	17:42 (2)	20:36	10:48 (5)	21:26	7	06:18 (10)
14	08:45		09:50 (6)	08:02		08:41 (9)	08:19 (5)	06:52	08:05 (8)	05:54		05:26
	17:01	108	14:12 (3)	17:55	8	08:49 (9)	17:41 (2)	20:38	10:46 (5)	21:27	7	06:18 (10)
15	08:44		09:50 (6)	08:00		08:39 (9)	08:18 (5)	06:50	09:12 (5)	05:53		05:25
	17:02	106	14:11 (3)	17:57	11	08:50 (9)	17:41 (2)	20:40	10:45 (5)	21:29	7	06:18 (10)
16	08:44		09:50 (6)	07:58		08:37 (9)	08:18 (5)	06:48	09:13 (5)	05:51		05:25
	17:04	106	14:11 (3)	17:59	13	08:50 (9)	17:40 (2)	20:41	10:43 (5)	21:30	8	06:19 (10)
17	08:43		09:51 (6)	07:56		08:35 (9)	08:16 (5)	06:46	09:14 (5)	05:50		05:25
	17:06	104	14:11 (3)	18:01	40	17:18 (2)	17:39 (2)	20:43	10:41 (5)	21:32	8	06:19 (10)
18	08:42		09:52 (6)	07:54		08:32 (9)	08:16 (5)	06:44	09:14 (5)	05:48		05:25
	17:07	101	14:10 (3)	18:03	67	17:21 (2)	17:38 (2)	20:45	10:39 (5)	21:33	8	06:19 (10)
19	08:41		09:53 (6)	07:52		08:30 (9)	08:16 (5)	06:41	09:15 (5)	05:47		05:25
	17:09	98	14:10 (3)	18:05	83	17:23 (2)	17:38 (2)	20:46	10:38 (5)	21:35	8	06:19 (10)
20	08:40		09:53 (6)	07:50		08:28 (9)	07:24 (8)	06:39	09:16 (5)	05:46		05:25
	17:10	96	14:09 (3)	18:06	96	17:25 (2)	17:36 (2)	20:48	10:36 (5)	21:36	8	06:19 (10)
21	08:39		09:54 (6)	07:48		08:26 (9)	07:22 (8)	06:37	09:17 (5)	05:44		05:25
	17:12	94	14:09 (3)	18:08	109	17:27 (2)	17:35 (2)	20:50	10:34 (5)	21:38	8	06:19 (10)
22	08:38		09:55 (6)	07:46		08:24 (9)	07:20 (8)	06:35	09:18 (5)	05:43		05:26
	17:14	92	14:09 (3)	18:10	120	17:30 (2)	17:34 (2)	20:51	10:31 (5)	21:39	8	06:19 (10)
23	08:36		09:56 (6)	07:44		08:23 (9)	07:17 (8)	06:33	09:19 (5)	05:42		05:26
	17:16	87	14:07 (3)	18:12	128	17:32 (2)	17:32 (2)	20:53	10:29 (5)	21:40	8	06:20 (10)
24	08:35		09:57 (6)	07:42		08:23 (9)	07:15 (8)	06:31	09:20 (5)	05:41		05:26
	17:17	84	14:07 (3)	18:14	132	17:33 (2)	17:30 (2)	20:55	10:27 (5)	21:42	8	06:20 (10)
25	08:34		09:58 (6)	07:40		08:24 (9)	07:13 (8)	06:29	09:21 (5)	05:39		05:26
	17:19	77	14:05 (3)	18:15	136	17:35 (2)	17:29 (2)	20:56	10:24 (5)	21:43	8	06:20 (10)
26	08:33		09:59 (6)	07:38		08:26 (9)	07:10 (8)	06:27	09:22 (5)	05:38		05:27
	17:21	74	14:05 (3)	18:17	139	17:37 (2)	17:26 (2)	20:58	10:22 (5)	21:44	8	06:21 (10)
27	08:31		10:00 (6)	07:36		08:28 (9)	07:08 (8)	06:25	09:23 (5)	05:37		05:27
	17:22	68	14:03 (3)	18:19	142	17:39 (2)	17:24 (2)	21:00	10:19 (5)	21:46	8	06:21 (10)
28	08:30		10:03 (6)	07:33		08:35 (5)	07:06 (8)	06:23	09:25 (5)	05:36		05:28
	17:24	59	14:01 (3)	18:21	139	17:40 (2)	17:21 (2)	21:01	10:16 (5)	21:47	7	06:21 (10)
29	08:29		10:04 (6)			07:28	08:04 (8)	06:21	09:28 (5)	05:35		05:28
	17:26	51	13:59 (3)			20:11	18:18 (2)	21:03	10:14 (5)	21:48	7	06:21 (10)
30	08:27		10:06 (6)			07:26	08:01 (8)	06:19	09:29 (5)	05:34		05:29
	17:28	40	13:55 (3)			20:13	18:09 (2)	21:05	10:11 (5)	21:49	6	06:21 (10)
31	08:26		10:10 (6)			07:24	07:59 (8)		05:33			
	17:30	18	13:48 (3)			20:14	11:04 (5)		21:50			
Potential sun hours	260		278			367		415		484		497
Total, worst case	2928		1396			5249		3108		81		170
Sun reduction	0,18		0,27			0,30		0,38		0,43		0,38
Oper. time red.	0,97		0,97			0,97		0,97		0,97		0,97
Wind dir. red.	0,65		0,59			0,60		0,57		0,56		0,69
Total reduction	0,12		0,16			0,18		0,22		0,24		0,26
Total, real	347		221			928		671		19		44

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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Project:

Alternatief 5: Wolk overnachtingsplaatsen

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17-03-2014 15:09 / 4

Licensed user:

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:30	06:15 (10)	06:06	06:55	07:58 (8)	07:43
2	22:05	6 06:21 (10)	21:34	20:33	128 10:51 (5)	19:24
3	05:31	06:17 (10)	06:09	06:58	07:42 (11)	07:46
4	05:32	06:17 (10)	06:10	07:00	07:39 (11)	07:48
5	05:32	06:18 (10)	06:12	07:01	10:52 (5)	19:17
6	05:33	06:19 (10)	06:13	07:03	10:53 (5)	19:15
7	05:34	06:20 (10)	06:15	07:04	10:53 (5)	19:12
8	05:35	06:21 (10)	06:16	07:06	10:54 (5)	19:10
9	05:36	06:22 (10)	06:18	07:07	10:54 (5)	19:08
10	05:37	06:23 (10)	06:19	07:09	10:55 (5)	19:06
11	05:38	06:24 (10)	06:20	07:11	10:55 (5)	19:03
12	05:39	06:25 (10)	06:21	07:12	10:56 (5)	19:01
13	05:40	06:26 (10)	06:22	07:13	10:56 (5)	18:59
14	05:41	06:27 (10)	06:23	07:14	10:57 (8)	18:57
15	05:42	06:28 (10)	06:24	07:15	10:57 (8)	18:55
16	05:43	06:29 (10)	06:25	07:16	10:58 (8)	18:53
17	05:44	06:30 (10)	06:26	07:17	10:58 (8)	18:51
18	05:45	06:31 (10)	06:27	07:18	10:59 (8)	18:49
19	05:46	06:32 (10)	06:28	07:19	10:59 (8)	18:47
20	05:47	06:33 (10)	06:29	07:20	10:59 (8)	18:45
21	05:48	06:34 (10)	06:30	07:21	10:59 (8)	18:43
22	05:49	06:35 (10)	06:31	07:22	10:59 (8)	18:41
23	05:50	06:36 (10)	06:32	07:23	10:59 (8)	18:39
24	05:51	06:37 (10)	06:33	07:24	10:59 (8)	18:37
25	05:52	06:38 (10)	06:34	07:25	10:59 (8)	18:35
26	05:53	06:39 (10)	06:35	07:26	10:59 (8)	18:33
27	05:54	06:40 (10)	06:36	07:27	10:59 (8)	18:31
28	05:55	06:41 (10)	06:37	07:28	10:59 (8)	18:29
29	05:56	06:42 (10)	06:38	07:29	10:59 (8)	18:27
30	05:57	06:43 (10)	06:39	07:30	10:59 (8)	18:25
31	05:58	06:44 (10)	06:40	07:31	10:59 (8)	18:23
32	05:59	06:45 (10)	06:41	07:32	10:59 (8)	18:21
33	06:00	06:46 (10)	06:42	07:33	10:59 (8)	18:19
34	06:01	06:47 (10)	06:43	07:34	10:59 (8)	18:17
35	06:02	06:48 (10)	06:44	07:35	10:59 (8)	18:15
36	06:03	06:49 (10)	06:45	07:36	10:59 (8)	18:13
37	06:04	06:50 (10)	06:46	07:37	10:59 (8)	18:11
38	06:05	06:51 (10)	06:47	07:38	10:59 (8)	18:09
39	06:06	06:52 (10)	06:48	07:39	10:59 (8)	18:07
40	06:07	06:53 (10)	06:49	07:40	10:59 (8)	18:05
41	06:08	06:54 (10)	06:50	07:41	10:59 (8)	18:03
42	06:09	06:55 (10)	06:51	07:42	10:59 (8)	18:01
43	06:10	06:56 (10)	06:52	07:43	10:59 (8)	17:59
44	06:11	06:57 (10)	06:53	07:44	10:59 (8)	17:57
45	06:12	06:58 (10)	06:54	07:45	10:59 (8)	17:55
46	06:13	06:59 (10)	06:55	07:46	10:59 (8)	17:53
47	06:14	07:00 (10)	06:56	07:47	10:59 (8)	17:51
48	06:15	07:01 (10)	06:57	07:48	10:59 (8)	17:49
49	06:16	07:02 (10)	06:58	07:49	10:59 (8)	17:47
50	06:17	07:03 (10)	06:59	07:50	10:59 (8)	17:45
51	06:18	07:04 (10)	07:00	07:51	10:59 (8)	17:43
52	06:19	07:05 (10)	07:01	07:52	10:59 (8)	17:41
53	06:20	07:06 (10)	07:02	07:53	10:59 (8)	17:39
54	06:21	07:07 (10)	07:03	07:54	10:59 (8)	17:37
55	06:22	07:08 (10)	07:04	07:55	10:59 (8)	17:35
56	06:23	07:09 (10)	07:05	07:56	10:59 (8)	17:33
57	06:24	07:10 (10)	07:06	07:57	10:59 (8)	17:31
58	06:25	07:11 (10)	07:07	07:58	10:59 (8)	17:29
59	06:26	07:12 (10)	07:08	07:59	10:59 (8)	17:27
60	06:27	07:13 (10)	07:09	08:00	10:59 (8)	17:25
61	06:28	07:14 (10)	07:10	08:01	10:59 (8)	17:23
62	06:29	07:15 (10)	07:11	08:02	10:59 (8)	17:21
63	06:30	07:16 (10)	07:12	08:03	10:59 (8)	17:19
64	06:31	07:17 (10)	07:13	08:04	10:59 (8)	17:17
65	06:32	07:18 (10)	07:14	08:05	10:59 (8)	17:15
66	06:33	07:19 (10)	07:15	08:06	10:59 (8)	17:13
67	06:34	07:20 (10)	07:16	08:07	10:59 (8)	17:11
68	06:35	07:21 (10)	07:17	08:08	10:59 (8)	17:09
69	06:36	07:22 (10)	07:18	08:09	10:59 (8)	17:07
70	06:37	07:23 (10)	07:19	08:10	10:59 (8)	17:05
71	06:38	07:24 (10)	07:20	08:11	10:59 (8)	17:03
72	06:39	07:25 (10)	07:21	08:12	10:59 (8)	17:01
73	06:40	07:26 (10)	07:22	08:13	10:59 (8)	16:59
74	06:41	07:27 (10)	07:23	08:14	10:59 (8)	16:57
75	06:42	07:28 (10)	07:24	08:15	10:59 (8)	16:55
76	06:43	07:29 (10)	07:25	08:16	10:59 (8)	16:53
77	06:44	07:30 (10)	07:26	08:17	10:59 (8)	16:51
78	06:45	07:31 (10)	07:27	08:18	10:59 (8)	16:49
79	06:46	07:32 (10)	07:28	08:19	10:59 (8)	16:47
80	06:47	07:33 (10)	07:29	08:20	10:59 (8)	16:45
81	06:48	07:34 (10)	07:30	08:21	10:59 (8)	16:43
82	06:49	07:35 (10)	07:31	08:22	10:59 (8)	16:41
83	06:50	07:36 (10)	07:32	08:23	10:59 (8)	16:39
84	06:51	07:37 (10)	07:33	08:24	10:59 (8)	16:37
85	06:52	07:38 (10)	07:34	08:25	10:59 (8)	16:35
86	06:53	07:39 (10)	07:35	08:26	10:59 (8)	16:33
87	06:54	07:40 (10)	07:36	08:27	10:59 (8)	16:31
88	06:55	07:41 (10)	07:37	08:28	10:59 (8)	16:29
89	06:56	07:42 (10)	07:38	08:29	10:59 (8)	16:27
90	06:57	07:43 (10)	07:39	08:30	10:59 (8)	16:25
91	06:58	07:44 (10)	07:40	08:31	10:59 (8)	16:23
92	06:59	07:45 (10)	07:41	08:32	10:59 (8)	16:21
93	07:00	07:46 (10)	07:42	08:33	10:59 (8)	16:19
94	07:01	07:47 (10)	07:43	08:34	10:59 (8)	16:17
95	07:02	07:48 (10)	07:44	08:35	10:59 (8)	16:15
96	07:03	07:49 (10)	07:45	08:36	10:59 (8)	16:13
97	07:04	07:50 (10)	07:46	08:37	10:59 (8)	16:11
98	07:05	07:51 (10)	07:47	08:38	10:59 (8)	16:09
99	07:06	07:52 (10)	07:48	08:39	10:59 (8)	16:07
100	07:07	07:53 (10)	07:49	08:40	10:59 (8)	16:05
101	07:08	07:54 (10)	07:50	08:41	10:59 (8)	16:03
102	07:09	07:55 (10)	07:51	08:42	10:59 (8)	16:01
103	07:10	07:56 (10)	07:52	08:43	10:59 (8)	15:59
104	07:11	07:57 (10)	07:53	08:44	10:59 (8)	15:57
105	07:12	07:58 (10)	07:54	08:45	10:59 (8)	15:55
106	07:13	07:59 (10)	07:55	08:46	10:59 (8)	15:53
107	07:14	08:00 (10)	07:56	08:47	10:59 (8)	15:51
108	07:15	08:01 (10)	07:57	08:48	10:59 (8)	15:49
109	07:16	08:02 (10)	07:58	08:49	10:59 (8)	15:47
110	07:17	08:03 (10)	07:59	08:50	10:59 (8)	15:45
111	07:18	08:04 (10)	08:00	08:51	10:59 (8)	15:43
112	07:19	08:05 (10)	08:01	08:52	10:59 (8)	15:41
113	07:20	08:06 (10)	08:02	08:53	10:59 (8)	15:39
114	07:21	08:07 (10)	08:03	08:54	10:59 (8)	15:37
115	07:22	08:08 (10)	08:04	08:55	10:59 (8)	15:35
116	07:23	08:09 (10)	08:05	08:56	10:59 (8)	15:33
117	07:24	08:10 (10)	08:06	08:57	10:59 (8)	15:31
118	07:25	08:11 (10)	08:07	08:58	10:59 (8)	15:29
119	07:26	08:12 (10)	08:08	08:59	10:59 (8)	15:27
120	07:27	08:13 (10)	08:09	09:00	10:59 (8)	15:25
121	07:28	08:14 (10)	08:10	09:01	10:59 (8)	15:23
122	07:29	08:15 (10)	08:11	09:02	10:59 (8)	15:21
123	07:30	08:16 (10)	08:12	09:03	10:59 (8)	15:19
124	07:31	08:17 (10)	08:13	09:04	10:59 (8)	15:17
125	07:32	08:18 (10)	08:14	09:05	10:59 (8)	15:15
126	07:33	08:19 (10)	08:15	09:06	10:59 (8)	15:13
127	07:34	08:20 (10)	08:16	09:07	10:59 (8)	15:11
128	07:35	08:21 (10)	08:17	09:08	10:59 (8)	15:09
129	07:36	08:22 (10)	08:18	09:09	10:59 (8)	15:07
130	07:37	08:23 (10)	08:19	09:10	10:59 (8)	15:05
131	07:38	08:24 (10)	08:20	09:11	10:59 (8)	15:03
132	07:39	08:25 (10)	08:21	09:12	10:59 (8)	15:01
133	07:40	08:26 (10)	08:22	09:13	10:59 (8)	14:59
134	07:41	08:27 (10)	08:23	09:14	10:59 (8)	14:57
135	07:42	08:28 (10)	08:24	09:15	10:59 (8)	14:55
136	07:43	08:29 (10)	08:25	09:16	10:59 (8)	14:53
137	07:44	08:30 (10)	08:26	09:17	10:59 (8)	14:51
138	07:45	08:31 (10)	08:27	09:18	10:59 (8)	14:49
139	07:46	08:32 (10)	08:28	09:19	10:59 (8)	14:47
140	07:47	08:33 (10)	08:29	09:20	10:59 (8)	14:45
141	07:48	08:34 (10)	08:30	09:21	10:59 (8)	14:43

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:50		11:41 (29)	08:24		09:06 (32)	07:31		17:42 (11)	07:21		19:16 (16)	06:17		06:57 (30)	05:32		06:47 (30)
	16:44	66	15:51 (24)	17:31	59	16:18 (24)	18:22	2	17:43 (11)	20:16	21	19:37 (16)	21:06	103	20:24 (21)	21:51	98	21:05 (19)
2	08:50		11:42 (29)	08:23		09:04 (32)	07:29		17:43 (11)	07:19		19:16 (16)	06:15		06:56 (30)	05:31		06:47 (30)
	16:45	65	15:52 (24)	17:33	61	16:18 (24)	18:24	2	17:45 (11)	20:18	19	19:35 (16)	21:08	107	20:26 (21)	21:53	98	21:05 (19)
3	08:50		11:42 (29)	08:21		09:02 (32)	07:27		17:44 (11)	07:17		19:18 (16)	06:13		06:54 (30)	05:31		06:47 (30)
	16:46	67	15:53 (24)	17:35	63	16:50 (14)	18:26	3	17:47 (11)	20:19	15	19:33 (16)	21:09	111	20:27 (21)	21:54	99	21:06 (19)
4	08:50		11:43 (29)	08:19		09:00 (32)	07:25		17:45 (11)	07:14		19:21 (16)	06:11		06:54 (30)	05:30		06:48 (30)
	16:47	67	15:55 (24)	17:37	64	16:52 (14)	18:28	3	17:48 (11)	20:21	8	19:29 (16)	21:11	113	20:28 (21)	21:55	99	21:07 (19)
5	08:50		11:45 (29)	08:18		08:58 (32)	07:22		17:49 (11)	07:12			06:10		06:53 (30)	05:29		06:47 (30)
	16:48	66	15:56 (24)	17:39	65	16:54 (14)	18:30	2	17:50 (11)	20:23			21:13	114	20:27 (21)	21:56	101	21:08 (19)
6	08:49		11:45 (29)	08:16		08:57 (32)	07:20			07:10			06:08		06:52 (30)	05:29		06:48 (30)
	16:50	67	15:57 (24)	17:40	65	16:57 (14)	18:31			20:24			21:14	115	20:27 (21)	21:57	101	21:09 (19)
7	08:49		11:46 (29)	08:14		08:55 (32)	07:18			07:08			06:06		06:51 (30)	05:28		06:48 (30)
	16:51	66	15:58 (24)	17:42	63	16:59 (14)	18:33			20:26			21:16	117	20:27 (21)	21:57	100	21:09 (19)
8	08:49		11:48 (29)	08:13		08:53 (32)	07:16			07:05			06:04		06:50 (30)	05:28		06:48 (30)
	16:52	67	16:01 (24)	17:44	54	16:09 (24)	18:35			20:28			21:18	117	20:26 (21)	21:58	101	21:10 (19)
9	08:48		11:49 (29)	08:11		08:52 (32)	07:14			07:03			06:02		06:50 (30)	05:27		06:49 (30)
	16:54	67	16:02 (24)	17:46	47	16:05 (24)	18:37			20:29			21:19	117	20:26 (21)	21:59	101	21:11 (19)
10	08:48		11:50 (29)	08:09		08:52 (32)	07:11			07:01			06:01		06:49 (30)	05:27		06:48 (30)
	16:55	66	16:03 (24)	17:48	38	09:30 (32)	18:38			20:31			21:21	118	20:26 (21)	22:00	101	21:11 (19)
11	08:47		11:51 (29)	08:07		08:52 (32)	07:09			06:59			05:59		06:49 (30)	05:26		06:49 (30)
	16:56	66	16:05 (24)	17:50	39	17:07 (18)	18:40			20:33			21:22	118	20:26 (21)	22:01	101	21:12 (19)
12	08:46		11:53 (29)	08:05		08:53 (32)	07:07			06:56			05:57		06:48 (30)	05:26		06:49 (30)
	16:58	64	16:06 (24)	17:52	41	17:09 (18)	18:42			20:34			21:24	118	20:25 (21)	22:01	102	21:13 (19)
13	08:46		11:55 (29)	08:04		08:53 (32)	07:05			06:54			05:56		06:48 (30)	05:26		06:50 (30)
	16:59	63	16:08 (24)	17:53	42	17:11 (18)	18:44			20:36			21:26	117	20:24 (21)	22:02	101	21:14 (19)
14	08:45		11:57 (29)	08:02		08:54 (32)	07:02			06:52			05:54		06:47 (30)	05:25		06:50 (30)
	17:01	60	16:10 (24)	17:55	43	17:13 (18)	18:45			20:38			21:27	116	20:23 (21)	22:03	102	21:14 (19)
15	08:44		11:59 (29)	08:00		08:55 (32)	07:00			06:50			05:53		06:47 (30)	05:25		06:50 (30)
	17:02	58	16:12 (24)	17:57	43	17:15 (18)	18:47			20:39			21:29	116	20:23 (21)	22:03	102	21:15 (19)
16	08:43		12:03 (29)	07:58		08:56 (32)	06:58			06:48			05:51		06:47 (30)	05:25		06:50 (30)
	17:04	53	16:14 (24)	17:59	44	17:18 (18)	18:49			20:41			21:30	116	20:23 (21)	22:04	102	21:15 (19)
17	08:43		15:32 (24)	07:56		08:56 (32)	06:56			06:46		20:00 (21)	05:50		06:46 (30)	05:25		06:50 (30)
	17:05	44	16:16 (24)	18:01	44	17:19 (18)	18:50			20:43	3	20:03 (21)	21:32	114	20:21 (21)	22:04	102	21:15 (19)
18	08:42		15:33 (24)	07:54		08:58 (32)	06:53			06:43		19:57 (21)	05:48		06:46 (30)	05:25		06:51 (30)
	17:07	45	16:18 (24)	18:03	41	17:21 (18)	18:52			20:44	8	20:05 (21)	21:33	114	20:21 (21)	22:05	102	21:16 (19)
19	08:41		15:33 (24)	07:52		09:00 (32)	06:51			06:41		19:54 (21)	05:47		06:46 (30)	05:25		06:51 (30)
	17:09	45	16:18 (24)	18:04	39	17:23 (18)	18:54			20:46	12	20:06 (13)	21:35	115	20:50 (19)	22:05	102	21:16 (19)
20	08:40		15:33 (24)	07:50		09:02 (32)	06:49			06:39		19:52 (21)	05:46		06:46 (30)	05:25		06:51 (30)
	17:10	45	16:18 (24)	18:06	36	17:25 (18)	18:56			20:48	16	20:08 (13)	21:36	114	20:51 (19)	22:05	102	21:16 (19)
21	08:39		15:34 (24)	07:48		09:08 (32)	06:46			06:37		19:50 (21)	05:44		06:47 (30)	05:25		06:51 (30)
	17:12	45	16:19 (24)	18:08	24	17:26 (18)	18:57			20:50	19	20:09 (13)	21:37	113	20:52 (19)	22:06	102	21:16 (19)
22	08:37		15:34 (24)	07:46		17:08 (18)	06:44		18:18 (16)	06:35		07:19 (30)	05:43		06:46 (30)	05:25		06:51 (30)
	17:14	45	16:19 (24)	18:10	17	17:25 (18)	18:59	3	18:21 (16)	20:51	42	20:11 (13)	21:39	113	20:53 (19)	22:06	102	21:16 (19)
23	08:36		15:34 (24)	07:44		17:09 (18)	06:42		18:16 (16)	06:33		07:14 (30)	05:42		06:46 (30)	05:26		06:52 (30)
	17:15	45	16:19 (24)	18:12	13	17:22 (18)	19:01	6	18:22 (16)	20:53	54	20:12 (13)	21:40	111	20:54 (19)	22:06	102	21:17 (19)
24	08:35		15:35 (24)	07:42		17:14 (18)	06:40		18:15 (16)	06:31		07:11 (30)	05:40		06:46 (30)	05:26		06:52 (30)
	17:17	45	16:20 (24)	18:13	3	17:17 (18)	19:02	9	18:24 (16)	20:55	63	20:14 (13)	21:42	110	20:55 (19)	22:06	101	21:17 (19)
25	08:34		09:17 (32)	07:40			06:37		18:15 (16)	06:29		07:08 (30)	05:39		06:46 (30)	05:26		06:52 (30)
	17:19	46	16:19 (24)	18:15			19:04	11	18:26 (16)	20:56	71	20:15 (13)	21:43	107	20:56 (19)	22:06	102	21:17 (19)
26	08:33		09:16 (32)	07:38			06:35		18:14 (16)	06:27		07:06 (30)	05:38		06:46 (30)	05:27		06:53 (30)
	17:21	49	16:20 (24)	18:17			19:06	13	18:27 (16)	20:58	78	20:17 (13)	21:44	103	20:57 (19)	22:06	102	21:18 (19)
27	08:31		09:14 (32)	07:35			06:33		18:14 (16)	06:25		07:03 (30)	05:37		06:47 (30)	05:27		06:53 (30)
	17:22	51	16:19 (24)	18:19			19:07	15	18:29 (16)	21:00	84	20:18 (13)	21:45	95	20:59 (19)	22:06	101	21:17 (19)
28	08:30		09:12 (32)	07:33			06:30		18:14 (16)	06:23		07:01 (30)	05:36		06:47 (30)	05:28		06:52 (30)
	17:24	54	16:19 (24)	18:21			19:09	17	18:31 (16)	21:01	90	20:20 (21)	21:47	94	21:00 (19)	22:06	103	21:17 (19)
29	08:28		09:11 (32)				07:28		19:13 (16)	06:21		07:00 (30)	05:35		06:46 (30)	05:28		06:53 (30)
	17:26	56	16:19 (24)				20:11	19	19:32 (16)	21:03	94	20:21 (21)	21:48	96	21:01 (19)	22:06	102	21:17 (19)
30	08:27		09:09 (32)				07:26		19:14 (16)	06:19		06:59 (30)	05:34		06:46 (30)	05:29		06:54 (30)
	17:28	57	16:19 (24)				20:12	20	19:34 (16)	21:05	99	20:23 (21)	21:49	97	21:02 (19)	22:06	101	21:17 (19)
31	08:26		09:07 (32)				07:23		19:15 (16)				05:33		06:46 (30)			
	17:30	59	16:18 (24)				20:14	21	19:36 (16)				21:50	98	21:03 (19)			
Potential sun hours	260			278			367			416			484			497		
Total, worst case		1759		1048			146			796			3427			3035		
Sun reduction		0,18		0,27			0,30			0,38			0,43			0,38		
Oper. time red.		0,97		0,97			0,97			0,97			0,97			0,97		
Wind dir. red.		0,68		0,62			0,61			0,59			0,61			0,62		
Total reduction		0,12		0,16			0,18			0,22			0,26			0,23		
Total, real		218		172			27			179			876			704		

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:53 (30)	06:05	06:59 (30)	06:55	07:43		07:36		08:21 (32)	08:27
	22:05	102	21:17 (19)	21:34	20:35 (21)	20:32	19:24		17:18	38	08:59 (32)	16:38
2	05:30		06:54 (30)	06:07	07:00 (30)	06:56	07:45		07:38		08:21 (32)	08:28
	22:05	102	21:17 (19)	21:32	20:36 (21)	20:30	19:21		17:16	49	15:36 (24)	16:38
3	05:31		06:53 (30)	06:08	07:00 (30)	06:58	07:46		07:40		08:23 (32)	08:29
	22:05	101	21:16 (19)	21:31	20:36 (21)	20:28	19:19		17:14	58	16:30 (14)	16:37
4	05:31		06:54 (30)	06:10	07:00 (30)	06:59	07:48		07:42		08:25 (32)	08:31
	22:04	101	21:16 (19)	21:29	20:36 (21)	20:26	19:17		17:13	64	16:28 (14)	16:36
5	05:32		06:54 (30)	06:12	07:01 (30)	07:01	07:50		07:43		08:27 (32)	08:32
	22:04	101	21:16 (19)	21:27	20:37 (21)	20:23	19:14		17:11	65	16:26 (14)	16:36
6	05:33		06:54 (30)	06:13	07:01 (30)	07:03	07:51		07:45		08:29 (32)	08:33
	22:03	101	21:15 (19)	21:25	20:36 (21)	20:21	19:12		17:09	63	16:24 (14)	16:35
7	05:34		06:55 (30)	06:15	07:02 (30)	07:04	07:53		07:47		08:31 (32)	08:35
	22:03	99	21:15 (19)	21:24	20:37 (21)	20:19	19:10		17:07	62	16:22 (14)	16:35
8	05:35		06:54 (30)	06:16	07:03 (30)	07:06	19:16 (16)	07:55	07:49		08:33 (32)	08:36
	22:02	100	21:14 (19)	21:22	20:37 (21)	20:17	19:23 (16)	19:08	17:06	63	16:20 (14)	16:35
9	05:36		06:54 (30)	06:18	07:03 (30)	07:07	19:12 (16)	07:56	17:06		08:35 (32)	08:37
	22:01	99	21:13 (19)	21:20	20:36 (21)	20:14	19:27 (16)	19:05	17:04	60	15:48 (24)	16:34
10	05:37		06:54 (30)	06:19	07:04 (30)	07:09	19:09 (16)	07:58	18:19 (11)	07:52	08:37 (32)	08:38
	22:01	99	21:13 (19)	21:18	20:36 (21)	20:12	19:28 (16)	19:03	18:22 (11)	17:03	15:49 (24)	16:34
11	05:38		06:55 (30)	06:21	07:05 (30)	07:11	19:08 (16)	08:00	18:17 (11)	07:54	08:39 (32)	08:39
	22:00	98	21:12 (19)	21:16	20:34 (21)	20:10	19:29 (16)	19:01	18:19 (11)	17:01	15:50 (24)	16:34
12	05:39		06:55 (30)	06:23	07:06 (30)	07:12	19:06 (16)	08:01	18:16 (11)	07:56	08:41 (32)	08:40
	21:59	98	21:12 (19)	21:14	20:33 (21)	20:07	19:27 (16)	18:59	18:17 (11)	16:59	15:51 (24)	16:34
13	05:40		06:55 (30)	06:24	07:07 (30)	07:14	19:05 (16)	08:03	18:16 (11)	07:57	08:43 (32)	08:41
	21:58	97	21:11 (19)	21:12	20:30 (21)	20:05	19:26 (16)	18:57	18:16 (11)	16:58	15:51 (24)	16:34
14	05:41		06:55 (30)	06:26	07:09 (30)	07:15	19:05 (16)	08:05	18:16 (11)	07:59	08:45 (32)	08:42
	21:57	96	21:10 (19)	21:10	20:29 (21)	20:03	19:24 (16)	18:54	18:16 (11)	16:57	15:52 (24)	16:34
15	05:42		06:55 (30)	06:27	07:09 (30)	07:17	19:03 (16)	08:06	18:16 (11)	08:01	08:47 (32)	08:43
	21:56	95	21:09 (19)	21:08	20:27 (21)	20:01	19:21 (16)	18:52	18:16 (11)	16:55	15:52 (24)	16:34
16	05:43		06:55 (30)	06:29	07:11 (30)	07:19	19:03 (16)	08:08	18:16 (11)	08:03	08:49 (32)	08:44
	21:55	94	21:08 (19)	21:07	20:25 (13)	19:58	19:19 (16)	18:50	18:16 (11)	16:54	15:53 (24)	16:34
17	05:45		06:55 (30)	06:30	07:13 (30)	07:20	19:02 (16)	08:10	18:16 (11)	08:04	08:51 (32)	08:45
	21:54	101	21:07 (19)	21:04	20:23 (13)	19:56	19:16 (16)	18:48	18:16 (11)	16:52	15:53 (24)	16:34
18	05:46		06:55 (30)	06:32	07:15 (30)	07:22	19:02 (16)	08:12	17:43 (18)	08:06	15:09 (24)	08:46
	21:53	106	21:06 (19)	21:02	20:22 (13)	19:54	19:14 (16)	18:46	17:51 (18)	16:51	15:54 (24)	16:35
19	05:47		06:56 (30)	06:34	07:17 (30)	07:23	19:02 (16)	08:13	17:40 (18)	08:08	15:09 (24)	08:46
	21:52	109	21:06 (19)	21:00	20:19 (13)	19:51	19:11 (16)	18:44	17:54 (18)	16:50	15:54 (24)	16:35
20	05:48		06:56 (30)	06:35	07:20 (30)	07:25	19:02 (16)	08:15	17:38 (18)	08:09	15:09 (24)	08:47
	21:51	111	21:05 (19)	20:58	20:17 (13)	19:49	19:09 (16)	18:42	17:56 (18)	16:49	15:54 (24)	16:35
21	05:50		06:56 (30)	06:37	07:24 (30)	07:27	19:03 (16)	08:17	17:56 (18)	16:49	15:54 (24)	16:35
	21:50	113	21:04 (19)	20:56	20:15 (13)	19:47	19:07 (16)	18:40	17:57 (18)	16:47	15:54 (24)	16:36
22	05:51		06:56 (30)	06:38	19:54 (21)	07:28	19:03 (16)	08:19	17:57 (18)	16:47	15:54 (24)	16:36
	21:48	114	21:03 (19)	20:54	20:13 (13)	19:44	19:04 (16)	18:38	17:55 (18)	16:46	15:54 (24)	16:36
23	05:52		06:56 (30)	06:40	19:56 (21)	07:30	19:04 (16)	08:20	17:55 (18)	16:46	15:54 (24)	16:36
	21:47	114	21:01 (19)	20:52	20:11 (13)	19:42	19:04 (16)	08:20	17:55 (18)	16:46	15:54 (24)	16:36
24	05:54		06:57 (30)	06:42	19:57 (21)	07:32	19:04 (16)	08:22	17:55 (18)	16:46	15:54 (24)	16:36
	21:46	114	21:01 (19)	20:50	20:09 (13)	19:40	19:04 (16)	08:22	17:55 (18)	16:46	15:54 (24)	16:36
25	05:55		06:57 (30)	06:43	20:00 (21)	07:33	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:44	114	20:59 (19)	20:48	20:07 (21)	19:37	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
26	05:57		06:57 (30)	06:45	20:03 (21)	07:35	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:43	114	20:32 (21)	20:46	20:05 (21)	19:35	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
27	05:58		06:57 (30)	06:47		07:36	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:42	114	20:32 (21)	20:43		19:33	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
28	06:00		06:58 (30)	06:48		07:38	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:40	115	20:33 (21)	20:41		19:30	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
29	06:01		06:58 (30)	06:50		07:40	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:39	116	20:34 (21)	20:39		19:28	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
30	06:02		06:58 (30)	06:51		07:41	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:37	117	20:34 (21)	20:37		19:26	19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
31	06:04		06:59 (30)	06:53			19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
	21:36	117	20:35 (21)	20:35			19:04 (16)	08:24	17:55 (18)	16:46	15:54 (24)	16:36
Potential sun hours	501			453		381		332		267		245
Total, worst case	3272			2077		205		496		1608		2024
Sun reduction	0,40			0,42		0,36		0,31		0,22		0,16
Oper. time red.	0,97			0,97		0,97		0,97		0,97		0,97
Wind dir. red.	0,61			0,60		0,61		0,61		0,67		0,67
Total reduction	0,24			0,25		0,22		0,18		0,14		0,11
Total, real	784			515		44		91		232		217

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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Project:

Alternatief 5: Wolk overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:50	08:24	12:30 (29)	07:31	11:57 (29)	07:21
	16:44	17:31	124	16:46 (20)	18:22	176
2	08:50	08:23	12:29 (29)	07:29	11:56 (29)	07:19
	16:45	17:33	127	16:48 (20)	18:24	179
3	08:50	08:21	12:27 (29)	07:27	11:55 (29)	07:17
	16:46	17:35	133	16:50 (20)	18:26	182
4	08:50	08:19	12:26 (29)	07:25	11:54 (29)	07:14
	16:47	17:37	132	16:49 (20)	18:28	182
5	08:50	08:18	12:24 (29)	07:22	11:53 (29)	07:12
	16:48	17:39	134	16:48 (20)	18:30	178
6	08:49	08:16	12:23 (29)	07:20	11:53 (29)	07:10
	16:50	17:41	131	16:46 (20)	18:31	179
7	08:49	08:14	12:22 (29)	07:18	11:51 (29)	07:08
	16:51	17:42	126	14:28 (29)	18:33	181
8	08:49	08:13	12:21 (29)	07:16	11:50 (29)	07:05
	16:52	17:44	128	14:29 (29)	18:35	182
9	08:48	08:11	12:19 (29)	07:14	11:50 (29)	07:03
	16:54	17:46	131	14:30 (29)	18:37	183
10	08:48	08:09	12:18 (29)	07:11	11:48 (29)	07:01
	16:55	17:48	134	14:32 (29)	18:38	184
11	08:47	08:07	12:17 (29)	07:09	11:48 (29)	06:59
	16:56	17:50	136	14:33 (29)	18:40	192
12	08:46	08:05	12:16 (29)	07:07	11:47 (29)	06:56
	16:58	17:52	138	14:34 (29)	18:42	200
13	08:46	08:04	12:14 (29)	07:05	11:46 (29)	06:54
	16:59	17:53	142	14:36 (29)	18:44	205
14	08:45	08:02	12:13 (29)	07:02	11:45 (29)	06:52
	17:01	17:55	144	14:37 (29)	18:45	211
15	08:44	13:09 (29)	08:00	12:12 (29)	07:00	11:45 (29)
	17:02	13:29 (29)	17:57	14:38 (29)	18:47	215
16	08:43	13:04 (29)	07:58	12:10 (29)	06:58	11:44 (29)
	17:04	13:35 (29)	17:59	14:38 (29)	18:49	218
17	08:43	13:00 (29)	07:56	12:09 (29)	06:56	07:31 (32)
	17:05	13:40 (29)	18:01	14:39 (29)	18:50	229
18	08:42	12:57 (29)	07:54	12:08 (29)	06:53	07:29 (32)
	17:07	13:44 (29)	18:03	14:40 (29)	18:52	240
19	08:41	12:55 (29)	07:52	12:07 (29)	06:51	07:26 (32)
	17:09	13:47 (29)	18:04	14:42 (29)	18:54	249
20	08:40	12:52 (29)	07:50	12:06 (29)	06:49	07:24 (32)
	17:10	13:50 (29)	18:06	14:43 (29)	18:56	257
21	08:39	12:50 (29)	07:48	12:05 (29)	06:46	07:22 (32)
	17:12	13:53 (29)	18:08	14:44 (29)	18:57	263
22	08:37	12:48 (29)	07:46	12:04 (29)	06:44	07:20 (32)
	17:14	13:56 (29)	18:10	14:45 (29)	18:59	271
23	08:36	12:45 (29)	07:44	12:02 (29)	06:42	07:17 (32)
	17:15	13:58 (29)	18:12	14:45 (29)	19:01	278
24	08:35	12:44 (29)	07:42	12:02 (29)	06:39	07:15 (32)
	17:17	16:30 (20)	18:13	14:46 (29)	19:02	283
25	08:34	12:41 (29)	07:40	12:01 (29)	06:37	07:13 (32)
	17:19	16:31 (20)	18:15	14:47 (29)	19:04	288
26	08:33	12:40 (29)	07:38	12:00 (29)	06:35	07:10 (32)
	17:21	16:34 (20)	18:17	14:47 (29)	19:06	293
27	08:31	12:38 (29)	07:35	11:59 (29)	06:33	07:08 (32)
	17:22	16:35 (20)	18:19	14:48 (29)	19:07	299
28	08:30	12:36 (29)	07:33	11:57 (29)	06:30	07:06 (32)
	17:24	16:37 (20)	18:21	17:41 (14)	19:09	298
29	08:28	12:35 (29)		07:28		08:03 (32)
	17:26	16:40 (20)		20:11	297	19:21 (18)
30	08:27	12:33 (29)		07:26		08:02 (32)
	17:28	16:41 (20)		20:12	298	19:21 (24)
31	08:26	12:31 (29)		07:23		08:01 (32)
	17:30	16:43 (20)		20:14	298	19:20 (24)
Potential sun hours	260	278	367	415	484	497
Total, worst case	1252	4091	7188	7078	1705	
Sun reduction	0,18	0,27	0,30	0,38	0,43	
Oper. time red.	0,97	0,97	0,97	0,97	0,97	
Wind dir. red.	0,70	0,70	0,68	0,68	0,69	
Total reduction	0,13	0,18	0,20	0,25	0,29	
Total, real	157	750	1437	1799	489	

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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Project:

Alternatief 5: Wolk overnachtingsplaatsen

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17-03-2014 15:09 / 8

Licensed user:

Witteveen+Bos

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

	N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
	595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December						
1	05:29		06:05	14:40 (29)	06:55	08:00 (32)	07:43	12:26 (29)	07:36	11:48 (29)	08:27						
	22:05		21:34	57	15:37 (29)	20:32	251	18:56 (24)	19:24	202	18:43 (24)	17:18	133	14:01 (29)	16:38		
2	05:30		06:07		14:35 (29)	06:56		07:58 (32)	07:45		12:26 (29)	07:38		11:49 (29)	08:28		
	22:05		21:32	64	15:39 (29)	20:30	264	19:01 (24)	19:21	196	18:41 (24)	17:16	131	14:00 (29)	16:38		
3	05:31		06:08		14:28 (29)	06:58		07:58 (32)	07:46		12:26 (29)	07:40		11:51 (29)	08:29		
	22:05		21:31	71	15:39 (29)	20:28	272	19:05 (24)	19:19	188	18:38 (24)	17:14	127	13:58 (29)	16:37		
4	05:32		06:10		14:20 (29)	06:59		07:56 (32)	07:48		12:27 (29)	07:42		11:52 (29)	08:31		
	22:04		21:29	80	15:40 (29)	20:26	278	19:06 (24)	19:17	183	15:30 (29)	17:13	125	13:57 (29)	16:36		
5	05:32		06:12		14:11 (29)	07:01		07:56 (32)	07:50		12:27 (29)	07:43		11:53 (29)	08:32		
	22:04		21:27	99	20:37 (16)	20:23	283	19:08 (24)	19:14	182	15:29 (29)	17:11	132	16:16 (20)	16:36		
6	05:33		06:13		13:56 (29)	07:03		07:55 (32)	07:51		12:28 (29)	07:45		11:55 (29)	08:33		
	22:03		21:25	118	20:38 (16)	20:21	286	19:08 (24)	19:12	181	15:29 (29)	17:09	133	16:19 (20)	16:35		
7	05:34		06:15		13:14 (29)	07:04		07:55 (32)	07:53		12:27 (29)	07:47		11:56 (29)	08:35		
	22:03		21:24	165	20:41 (16)	20:19	290	19:10 (24)	19:10	180	15:27 (29)	17:07	134	16:20 (20)	16:35		
8	05:35		06:16		13:04 (29)	07:06		07:54 (32)	07:55		12:28 (29)	07:49		11:58 (29)	08:36		
	22:02		21:22	176	20:39 (16)	20:17	293	19:10 (24)	19:08	179	15:27 (29)	17:06	131	16:20 (20)	16:35		
9	05:36		06:18		12:59 (29)	07:07		07:54 (32)	07:56		12:28 (29)	07:50		12:00 (29)	08:37		
	22:01		21:20	181	20:37 (16)	20:14	295	19:11 (24)	19:05	184	18:25 (14)	17:04	128	16:19 (20)	16:34		
10	05:37		06:19		12:56 (29)	07:09		07:53 (32)	07:58		12:29 (29)	07:52		12:01 (29)	08:38		
	22:01		21:18	184	20:36 (16)	20:12	295	19:11 (24)	19:03	182	18:22 (14)	17:03	123	16:17 (20)	16:34		
11	05:38		06:21		12:53 (29)	07:11		07:53 (32)	08:00		12:29 (29)	07:54		12:03 (29)	08:39		
	22:00		21:16	186	20:34 (16)	20:10	297	19:12 (24)	19:01	180	18:19 (14)	17:01	119	16:15 (20)	16:34		
12	05:39		06:23		12:51 (29)	07:12		07:53 (32)	08:01		12:29 (29)	07:56		12:05 (29)	08:40		
	21:59		21:14	188	20:33 (16)	20:07	297	19:11 (24)	18:59	179	18:17 (14)	16:59	113	16:13 (20)	16:34		
13	05:40		06:24		12:49 (29)	07:14		07:53 (32)	08:03		12:30 (29)	07:57		12:07 (29)	08:41		
	21:58		21:12	188	20:30 (16)	20:05	298	19:12 (24)	18:57	175	18:15 (14)	16:58	109	16:12 (20)	16:34		
14	05:41		06:26		12:47 (29)	07:15		07:54 (32)	08:05		12:31 (29)	07:59		12:09 (29)	08:42		
	21:57		21:10	190	20:29 (16)	20:03	297	19:12 (18)	18:54	172	18:13 (14)	16:57	103	16:10 (20)	16:34		
15	05:42		06:27		12:46 (29)	07:17		07:55 (32)	08:06		12:32 (29)	08:01		12:11 (29)	08:43		
	21:56		21:08	190	20:27 (16)	20:01	298	19:14 (18)	18:52	168	15:20 (29)	16:55	97	16:08 (20)	16:34		
16	05:43		06:29		12:45 (29)	07:19		07:57 (32)	08:08		12:32 (29)	08:03		12:13 (29)	08:44		
	21:55		21:06	189	20:25 (16)	19:58	299	19:19 (11)	18:50	167	15:19 (29)	16:54	93	16:07 (20)	16:34		
17	05:45		06:30		12:43 (29)	07:20		07:58 (32)	08:10		12:32 (29)	08:04		12:15 (29)	08:45		
	21:54		21:04	189	20:23 (16)	19:56	295	19:16 (11)	18:48	165	15:17 (29)	16:52	86	16:05 (20)	16:34		
18	05:46	21:04 (13)	06:32		12:42 (29)	07:22		08:00 (32)	08:12		12:33 (29)	08:06		12:18 (29)	08:46		
	21:53	2	21:06 (13)	21:02	189	20:22 (16)	19:54	290	19:14 (11)	18:46	164	15:17 (29)	16:51	80	16:04 (20)	16:35	
19	05:47	21:03 (13)	06:34		12:41 (29)	07:23		08:01 (32)	08:13		12:34 (29)	08:08		12:20 (29)	08:46		
	21:52	3	21:06 (13)	21:00	187	15:48 (29)	19:51	285	19:11 (11)	18:44	162	15:16 (29)	16:50	73	13:33 (29)	16:35	
20	05:48	21:01 (13)	06:35		12:39 (29)	07:25		08:03 (32)	08:15		12:35 (29)	08:09		12:23 (29)	08:47		
	21:51	4	21:05 (13)	20:58	189	15:48 (29)	19:49	278	19:09 (18)	18:42	160	15:15 (29)	16:49	68	13:31 (29)	16:35	
21	05:50	21:00 (13)	06:37		12:39 (29)	07:27		08:05 (32)	08:17		12:36 (29)	08:11		12:25 (29)	08:47		
	21:50	4	21:04 (13)	20:56	189	15:48 (29)	19:47	272	19:07 (18)	18:40	158	15:14 (29)	16:47	63	13:28 (29)	16:36	
22	05:51	20:59 (13)	06:38		08:19 (32)	07:28		08:06 (32)	08:19		12:37 (29)	08:13		12:28 (29)	08:48		
	21:48	4	21:03 (13)	20:54	202	15:48 (29)	19:44	267	19:04 (18)	18:38	156	15:13 (29)	16:46	58	13:26 (29)	16:36	
23	05:52	20:59 (13)	06:40		08:15 (32)	07:30		08:08 (32)	08:20		12:38 (29)	08:14		12:31 (29)	08:48		
	21:47	2	21:01 (13)	20:52	213	15:49 (29)	19:42	259	19:02 (18)	18:35	154	15:12 (29)	16:45	52	13:23 (29)	16:37	
24	05:54	20:59 (13)	06:42		08:11 (32)	07:32		08:09 (32)	08:22		12:39 (29)	08:16		12:34 (29)	08:49		
	21:46	2	21:01 (13)	20:50	219	15:48 (29)	19:40	251	18:59 (18)	18:33	152	15:11 (29)	16:44	47	13:21 (29)	16:37	
25	05:55	20:58 (13)	06:43		08:10 (32)	07:33		08:11 (32)	07:24		11:40 (29)	08:18		12:28 (29)	08:49		
	21:44	2	20:59 (13)	20:48	223	15:49 (29)	19:37	244	18:57 (18)	17:31	149	14:09 (29)	16:43	40	13:18 (29)	16:38	
26	05:57	20:57 (13)	06:45		08:07 (32)	07:35		08:13 (32)	07:26		11:41 (29)	08:19		12:43 (29)	08:50		
	21:43		20:46	228	15:48 (29)	19:35	233	18:55 (18)	17:29	147	14:08 (29)	16:42	31	13:14 (29)	16:38		
27	05:58	15:08 (29)	06:47		08:06 (32)	07:36		12:25 (29)	07:27		11:42 (29)	08:21		12:49 (29)	08:50		
	21:42	17	15:25 (29)	20:43	231	15:49 (29)	19:33	220	18:52 (24)	17:27	145	14:07 (29)	16:41	20	13:09 (29)	16:39	
28	06:00	15:02 (29)	06:48		08:04 (32)	07:38		12:26 (29)	07:29		11:43 (29)	08:22		12:50 (29)	08:50		
	21:40	28	15:30 (29)	20:41	235	15:48 (29)	19:30	216	18:50 (24)	17:26	143	14:06 (29)	16:40		16:40	3	15:47 (17)
29	06:01	14:56 (29)	06:50		08:03 (32)	07:40		12:26 (29)	07:31		11:44 (29)	08:24		12:50 (29)	08:50		15:46 (17)
	21:39	36	15:32 (29)	20:39	238	15:49 (29)	19:28	212	18:48 (24)	17:24	141	14:05 (29)	16:40		16:41	2	15:48 (17)
30	06:02	14:51 (29)	06:51		08:01 (32)	07:41		12:25 (29)	07:33		11:45 (29)	08:25		12:50 (29)	08:50		
	21:37	42	15:33 (29)	20:37	241	15:48 (29)	19:26	207	18:45 (24)	17:22	139	14:04 (29)	16:39		16:42		
31	06:04	14:46 (29)	06:53		08:00 (32)			07:34			11:47 (29)			12:50 (29)	08:50		
	21:35	50	15:36 (29)	20:35	243	15:48 (29)		17:20	135	14:02 (29)				16:43			
Potential sun hours	501		453		381			332			267			245			
Total, worst case	196		5542		8122			5168			2549			45			
Sun reduction	0,40		0,42		0,36			0,31			0,22			0,16			
Oper. time red.	0,97		0,97		0,97			0,97			0,97			0,97			
Wind dir. red.	0,68		0,69		0,67			0,70			0,70			0,71			
Total reduction	0,26		0,28		0,24			0,21			0,15			0,11			
Total, real	52		1566		1910			1072			381			5			

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
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Project:

Alternatief 5: Wolk overnachtingsplaatsen

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Licensed user:

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Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (26)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:51	08:24	07:31	07:21	06:17	05:32	05:29	06:06	06:55	07:43	07:36	08:27
	16:44	17:31	18:23	20:16	21:06	21:52	22:06	21:34	20:33	19:24	17:18	16:38
2	08:51	08:23	07:29	07:19	06:15	05:31	05:30	06:07	06:56	07:45	07:38	08:28
	16:45	17:33	18:24	20:18	21:08	21:53	22:05	21:32	20:30	19:21	17:16	16:38
3	08:50	08:21	07:27	07:17	06:13	05:31	05:31	06:09	06:58	07:46	07:40	08:30
	16:46	17:35	18:26	20:19	21:10	21:54	22:05	21:31	20:28	19:19	17:14	16:37
4	08:50	08:20	07:25	07:14	06:11	05:30	05:32	06:10	07:00	07:48	07:42	08:31
	16:47	17:37	18:28	20:21	21:11	21:55	22:04	21:29	20:26	19:17	17:13	16:36
5	08:50	08:18	07:23	07:12	06:10	05:29	05:32	06:12	07:01	07:50	07:43	08:32
	16:49	17:39	18:30	20:23	21:13	21:56	22:04	21:27	20:24	19:15	17:11	16:36
6	08:50	08:16	07:20	07:10	06:08	05:29	05:33	06:13	07:03	07:51	07:45	08:34
	16:50	17:41	18:31	20:24	21:15	21:57	22:03	21:26	20:21	19:12	17:09	16:35
7	08:49	08:15	07:18	07:08	06:06	05:28	05:34	06:15	07:04	07:53	07:47	08:35
	16:51	17:42	18:33	20:26	21:16	21:58	22:03	21:24	20:19	19:10	17:08	16:35
8	08:49	08:13	07:16	07:05	06:04	05:28	05:35	06:16	07:06	07:55	07:49	08:36
	16:52	17:44	18:35	20:28	21:18	21:59	22:02	21:22	20:17	19:08	17:06	16:35
9	08:48	08:11	07:14	07:03	06:03	05:27	05:36	06:18	07:08	07:56	07:51	08:37
	16:54	17:46	18:37	20:29	21:19	21:59	22:02	21:20	20:14	19:06	17:04	16:34
10	08:48	08:09	07:12	07:01	06:01	05:27	05:37	06:19	07:09	07:58	07:52	08:38
	16:55	17:48	18:38	20:31	21:21	22:00	22:01	21:18	20:12	19:03	17:03	16:34
11	08:47	08:07	07:09	06:59	05:59	05:26	05:38	06:21	07:11	08:00	07:54	08:39
	16:56	17:50	18:40	20:33	21:23	22:01	22:00	21:16	20:10	19:01	17:01	16:34
12	08:47	08:06	07:07	06:57	05:58	05:26	05:39	06:23	07:12	08:02	07:56	08:40
	16:58	17:52	18:42	20:35	21:24	22:02	21:59	21:15	20:08	18:59	17:00	16:34
13	08:46	08:04	07:05	06:54	05:56	05:26	05:40	06:24	07:14	08:03	07:58	08:41
	16:59	17:54	18:44	20:36	21:26	22:02	21:58	21:13	20:05	18:57	16:58	16:34
14	08:45	08:02	07:03	06:52	05:54	05:25	05:41	06:26	07:16	08:05	07:59	08:42
	17:01	17:55	18:45	20:38	21:27	22:03	21:58	21:11	20:03	18:55	16:57	16:34
15	08:44	08:00	07:00	06:50	05:53	05:25	05:42	06:27	07:17	08:07	08:01	08:43
	17:02	17:57	18:47	20:40	21:29	22:03	21:57	21:09	20:01	18:52	16:55	16:34
16	08:44	07:58	06:58	06:48	05:51	05:25	05:44	06:29	07:19	08:08	08:03	08:44
	17:04	17:59	18:49	20:41	21:30	22:04	21:56	21:07	19:58	18:50	16:54	16:34
17	08:43	07:56	06:56	06:46	05:50	05:25	05:45	06:31	07:20	08:10	08:05	08:45
	17:06	18:01	18:51	20:43	21:32	22:04	21:54	21:05	19:56	18:48	16:52	16:34
18	08:42	07:54	06:53	06:44	05:48	05:25	05:46	06:32	07:22	08:12	08:06	08:46
	17:07	18:03	18:52	20:45	21:33	22:05	21:53	21:03	19:54	18:46	16:51	16:35
19	08:41	07:52	06:51	06:41	05:47	05:25	05:47	06:34	07:24	08:13	08:08	08:46
	17:09	18:05	18:54	20:46	21:35	22:05	21:52	21:01	19:51	18:44	16:50	16:35
20	08:40	07:50	06:49	06:39	05:46	05:25	05:49	06:35	07:25	08:15	08:10	08:47
	17:10	18:06	18:56	20:48	21:36	22:05	21:51	20:59	19:49	18:42	16:49	16:35
21	08:39	07:48	06:47	06:37	05:44	05:25	05:50	06:37	07:27	08:17	08:11	08:48
	17:12	18:08	18:57	20:50	21:38	22:06	21:50	20:56	19:47	18:40	16:48	16:36
22	08:38	07:46	06:44	06:35	05:43	05:26	05:51	06:39	07:28	08:19	08:13	08:48
	17:14	18:10	18:59	20:51	21:39	22:06	21:49	20:54	19:44	18:38	16:46	16:36
23	08:36	07:44	06:42	06:33	05:42	05:26	05:53	06:40	07:30	08:20	08:15	08:49
	17:15	18:12	19:01	20:53	21:40	22:06	21:47	20:52	19:42	18:36	16:45	16:37
24	08:35	07:42	06:40	06:31	05:40	05:26	05:54	06:42	07:32	08:22	08:16	08:49
	17:17	18:14	19:02	20:55	21:42	22:06	21:46	20:50	19:40	18:34	16:44	16:37
25	08:34	07:40	06:37	06:29	05:39	05:26	05:55	06:43	07:33	08:24	08:18	08:50
	17:19	18:15	19:04	20:56	21:43	22:06	21:45	20:48	19:37	17:32	16:43	16:38
26	08:33	07:38	06:35	06:27	05:38	05:27	05:57	06:45	07:35	08:26	08:19	08:50
	17:21	18:17	19:06	20:58	21:44	22:06	21:43	20:46	19:35	17:30	16:42	16:39
27	08:31	07:36	06:33	06:25	05:37	05:27	05:58	06:47	07:37	08:27	08:21	08:50
	17:22	18:19	19:08	21:00	21:46	22:06	21:42	20:44	19:33	17:28	16:41	16:39
28	08:30	07:33	06:30	06:23	05:36	05:28	06:00	06:48	07:38	08:29	08:22	08:50
	17:24	18:21	19:09	21:01	21:47	22:06	21:40	20:41	19:31	17:26	16:41	16:40
29	08:29		07:28	06:21	05:35	05:28	06:01	06:50	07:40	08:31	08:24	08:50
	17:26		20:11	21:03	21:48	22:06	21:39	20:39	19:28	17:24	16:40	16:41
30	08:27		07:26	06:19	05:34	05:29	06:03	06:51	07:41	08:33	08:25	08:51
	17:28		20:13	21:05	21:49	22:06	21:37	20:37	19:26	17:22	16:39	16:42
31	08:26		07:24		05:33		06:04	06:53		07:35		08:51
	17:30		20:14		21:51		21:36	20:35		17:20		16:43
Potential sun hours	260	278	367	416	484	497	501	453	381	332	267	245
Total, worst case												
Sun reduction												
Oper. time red.												
Wind dir. red.												
Total reduction												
Total, real												

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)

Project:

Alternatief 5: Wolk overnachtingsplaatsen

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Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:35/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (27)

Assumptions for shadow calculations

Maximum distance for influence

2.000 m

Minimum sun height over horizon for influence

5 °

Day step for calculation

1 days

Time step for calculation

1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
595	537	663	598	435	470	753	1.470	1.146	792	522	542	8.522

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	06:17 21:06	05:32 21:52	05:29 22:05	06:06 21:34	06:55 20:33	07:43 19:24	07:36 17:18	08:27 16:38
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	06:15 21:08	05:31 21:53	05:30 22:05	06:07 21:32	06:56 20:30	07:45 19:21	07:38 17:16	08:28 16:38
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	06:13 21:10	05:31 21:54	05:31 22:05	06:09 21:31	06:58 20:28	07:46 19:19	07:40 17:14	08:30 16:37
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	06:11 21:11	05:30 21:55	05:32 22:04	06:10 21:29	07:00 20:26	07:48 19:17	07:42 17:13	08:31 16:36
5	08:50 16:48	08:18 17:39	07:23 18:30	07:12 20:23	06:10 21:13	05:29 21:56	05:32 22:04	06:12 21:27	07:01 20:24	07:50 19:15	07:43 17:11	08:32 16:36
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	06:08 21:15	05:29 21:57	05:33 22:03	06:13 21:26	07:03 20:21	07:51 19:12	07:45 17:09	08:34 16:35
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	06:06 21:16	05:28 21:58	05:34 22:03	06:15 21:24	07:04 20:19	07:53 19:10	07:47 17:08	08:35 16:35
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	06:04 21:18	05:28 21:59	05:35 22:02	06:16 21:22	07:06 20:17	07:55 19:08	07:49 17:06	08:36 16:35
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	06:03 21:19	05:27 21:59	05:36 22:02	06:18 21:20	07:08 20:14	07:56 19:06	07:51 17:04	08:37 16:34
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	06:01 21:21	05:27 22:00	05:37 22:01	06:19 21:18	07:09 20:12	07:58 19:03	07:52 17:03	08:38 16:34
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	05:59 21:23	05:26 22:01	05:38 22:00	06:21 21:16	07:11 20:10	08:00 19:01	07:54 17:01	08:39 16:34
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	05:58 21:24	05:26 22:02	05:39 21:59	06:23 21:15	07:12 20:08	08:01 18:59	07:56 17:00	08:40 16:34
13	08:46 16:59	08:04 17:53	07:05 18:44	06:54 20:36	05:56 21:26	05:26 22:02	05:40 21:58	06:24 21:13	07:14 20:05	08:03 18:57	07:58 16:58	08:41 16:34
14	08:45 17:01	08:02 17:55	07:02 18:45	06:52 20:38	05:54 21:27	05:25 22:03	05:41 21:57	06:26 21:11	07:16 20:03	08:05 18:55	07:59 16:57	08:42 16:34
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	05:53 21:29	05:25 22:03	05:42 21:57	06:27 21:09	07:17 20:01	08:07 18:52	08:01 16:55	08:43 16:34
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	05:51 21:30	05:25 22:04	05:44 21:56	06:29 21:07	07:19 19:58	08:08 18:50	08:03 16:54	08:44 16:34
17	08:43 17:05	07:56 18:01	06:56 18:51	06:46 20:43	05:50 21:32	05:25 22:04	05:45 21:54	06:31 21:05	07:20 19:56	08:10 18:48	08:05 16:52	08:45 16:34
18	08:42 17:07	07:54 18:03	06:53 18:52	06:43 20:45	05:48 21:33	05:25 22:05	05:46 21:53	06:32 21:03	07:22 19:54	08:12 18:46	08:06 16:51	08:46 16:35
19	08:41 17:09	07:52 18:04	06:51 18:54	06:41 20:46	05:47 21:35	05:25 22:05	05:47 21:52	06:34 21:01	07:24 19:51	08:13 18:44	08:08 16:50	08:46 16:35
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	05:46 21:36	05:25 22:05	05:49 21:51	06:35 20:58	07:25 19:49	08:15 18:42	08:10 16:49	08:47 16:35
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50	05:44 21:38	05:25 22:06	05:50 21:50	06:37 20:56	07:27 19:47	08:17 18:40	08:11 16:47	08:48 16:36
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51	05:43 21:39	05:26 22:06	05:51 21:49	06:39 20:54	07:28 19:44	08:19 18:38	08:13 16:46	08:48 16:36
23	08:36 17:15	07:44 18:12	06:42 19:01	06:33 20:53	05:42 21:40	05:26 22:06	05:53 21:47	06:40 20:52	07:30 19:42	08:20 18:36	08:15 16:45	08:49 16:37
24	08:35 17:17	07:42 18:14	06:40 19:02	06:31 20:55	05:40 21:42	05:26 22:06	05:54 21:46	06:42 20:50	07:32 19:40	08:22 18:34	08:16 16:44	08:49 16:37
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56	05:39 21:43	05:26 22:06	05:55 21:45	06:43 20:48	07:33 19:37	08:24 17:32	08:18 16:43	08:50 16:38
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	05:38 21:44	05:27 22:06	05:57 21:43	06:45 20:46	07:35 19:35	08:26 17:30	08:19 16:42	08:50 16:39
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	05:37 21:46	05:27 22:06	05:58 21:42	06:47 20:44	07:37 19:33	08:27 17:28	08:19 16:41	08:50 16:39
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	05:36 21:47	05:28 22:06	06:00 21:40	06:48 20:41	07:38 19:31	08:29 17:26	08:11 16:40	08:50 16:40
29	08:29 17:26		07:28 20:11	06:21 21:03	05:35 21:48	05:28 22:06	06:01 21:39	06:50 20:39	07:40 19:28	08:31 17:24	08:13 16:40	08:50 16:41
30	08:27 17:28		07:26 20:13	06:19 21:05	05:34 21:49	05:29 22:06	06:03 21:37	06:51 20:37	07:41 19:26	08:33 17:22	08:15 16:39	08:51 16:42
31	08:26 17:30		07:24 20:14		05:33 21:51		06:04 21:36	06:53 20:35		07:35 17:20		08:51 16:43
Potential sun hours	260	278	367	416	484	497	501	453	381	332	267	245
Total, worst case		25								25		
Sun reduction		0,27								0,31		
Oper. time red.		0,97								0,97		
Wind dir. red.		0,56								0,56		
Total reduction		0,15								0,17		
Total, real		4								4		

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 1

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:51		12:07 (18)	08:24	09:23 (17)	07:31		08:08 (16)	07:21	07:57 (12)	06:17	06:55 (5)	05:32	06:54 (10)				
	16:44	90	15:41 (19)	17:31	115	15:58 (19)	18:23	29	08:37 (16)	20:16	60	19:04 (8)	21:06	50	07:45 (11)	21:52	56	07:50 (10)
2	08:51		12:07 (18)	08:23		09:04 (23)	07:29		08:08 (16)	07:19	07:54 (12)	06:15	06:53 (5)	05:32	06:53 (10)			
	16:45	92	15:42 (19)	17:33	114	15:58 (19)	18:24	30	08:38 (16)	20:18	64	19:03 (8)	21:08	52	07:45 (11)	21:53	58	07:51 (10)
3	08:50		12:08 (18)	08:21		09:02 (23)	07:27		08:08 (16)	07:17	07:52 (12)	06:13	06:51 (5)	05:31	06:53 (10)			
	16:46	92	15:43 (19)	17:35	112	15:57 (19)	18:26	30	08:38 (16)	20:19	68	19:04 (8)	21:10	53	07:44 (11)	21:54	59	07:52 (10)
4	08:50		12:08 (18)	08:19		09:00 (23)	07:25		08:07 (16)	07:14	07:50 (12)	06:11	06:50 (5)	05:30	06:53 (10)			
	16:47	93	15:44 (19)	17:37	108	15:56 (19)	18:28	30	08:37 (16)	20:21	70	19:04 (8)	21:11	55	07:45 (11)	21:55	59	07:52 (10)
5	08:50		12:09 (18)	08:18		08:59 (23)	07:23		08:08 (16)	07:12	07:48 (12)	06:10	06:48 (5)	05:29	06:52 (10)			
	16:49	94	15:45 (19)	17:39	100	15:57 (19)	18:30	29	08:37 (16)	20:23	72	19:04 (8)	21:13	56	07:44 (11)	21:56	60	07:52 (10)
6	08:50		12:09 (18)	08:16		08:57 (23)	07:20		08:08 (16)	07:10	07:45 (12)	06:08	06:46 (5)	05:29	06:52 (10)			
	16:50	95	15:46 (19)	17:41	89	15:56 (19)	18:31	28	08:36 (16)	20:24	73	19:03 (8)	21:15	57	07:43 (11)	21:57	61	07:53 (10)
7	08:49		12:09 (18)	08:14		08:55 (23)	07:18		08:08 (16)	07:08	07:43 (12)	06:06	06:46 (5)	05:28	06:52 (10)			
	16:51	96	15:46 (19)	17:42	87	15:54 (19)	18:33	27	08:35 (16)	20:26	75	19:03 (8)	21:16	57	07:43 (11)	21:58	62	07:54 (10)
8	08:49		12:10 (18)	08:13		08:53 (23)	07:16		08:09 (16)	07:05	07:41 (12)	06:04	06:46 (5)	05:28	06:52 (10)			
	16:52	97	15:48 (19)	17:44	88	15:53 (19)	18:35	25	08:34 (16)	20:28	76	19:03 (8)	21:18	56	07:42 (11)	21:58	62	07:54 (10)
9	08:48		09:36 (22)	08:11		08:51 (23)	07:14		08:10 (16)	07:03	07:41 (12)	06:03	06:47 (5)	05:27	06:52 (10)			
	16:54	99	15:48 (19)	17:46	87	15:51 (19)	18:37	23	08:33 (16)	20:29	74	19:02 (8)	21:19	55	07:42 (11)	21:59	63	07:55 (10)
10	08:48		09:35 (22)	08:09		08:49 (23)	07:12		08:11 (16)	07:01	07:43 (12)	06:01	06:47 (5)	05:27	06:51 (10)			
	16:55	103	15:49 (19)	17:48	84	15:49 (19)	18:38	21	08:32 (16)	20:31	70	19:02 (8)	21:21	54	07:41 (11)	22:00	63	07:54 (10)
11	08:47		09:34 (22)	08:07		08:48 (23)	07:09		08:12 (16)	06:59	07:46 (12)	05:59	06:48 (5)	05:26	06:51 (10)			
	16:56	106	15:50 (19)	17:50	76	15:44 (19)	18:40	17	08:29 (16)	20:33	63	19:02 (8)	21:23	52	07:41 (11)	22:01	64	07:55 (10)
12	08:47		09:34 (22)	08:06		08:49 (23)	07:07		08:15 (16)	06:57	18:03 (8)	05:58	06:48 (5)	05:26	06:52 (10)			
	16:58	108	15:51 (19)	17:52	65	10:06 (17)	18:42	11	08:26 (16)	20:34	57	19:00 (8)	21:24	48	07:39 (11)	22:02	64	07:56 (10)
13	08:46		09:33 (22)	08:04		08:50 (23)	07:05			06:54	18:03 (8)	05:56	06:49 (5)	05:26	06:52 (10)			
	16:59	110	15:52 (19)	17:54	63	10:06 (17)	18:44			20:36	19:00 (8)	21:26	46	07:39 (11)	22:02	64	07:56 (10)	
14	08:45		09:32 (22)	08:02		08:51 (23)	07:02			06:52	18:04 (8)	05:54	06:50 (5)	05:26	06:52 (10)			
	17:01	113	15:53 (19)	17:55	60	10:06 (17)	18:45			20:38	18:59 (8)	21:27	40	07:37 (11)	22:03	65	07:57 (10)	
15	08:44		09:31 (22)	08:00		08:54 (23)	07:00			06:50	18:05 (8)	05:53	06:52 (5)	05:25	06:52 (10)			
	17:02	116	15:54 (19)	17:57	55	10:06 (17)	18:47			20:40	18:58 (8)	21:29	34	07:36 (11)	22:03	65	07:57 (10)	
16	08:44		09:29 (22)	07:58		09:20 (17)	06:58			06:48	18:05 (8)	05:51	06:55 (5)	05:25	06:52 (10)			
	17:04	119	15:54 (19)	17:59	46	10:06 (17)	18:49			20:41	18:57 (8)	21:30	26	07:35 (11)	22:04	65	07:57 (10)	
17	08:43		09:28 (22)	07:56		09:20 (17)	06:56			06:46	18:06 (8)	05:50	07:15 (10)	05:25	06:52 (10)			
	17:06	120	15:54 (19)	18:01	45	10:05 (17)	18:51			20:43	18:56 (8)	21:32	18	07:33 (11)	22:04	66	07:58 (10)	
18	08:42		09:27 (22)	07:54		09:20 (17)	06:53			06:44	07:24 (11)	05:48	07:10 (10)	05:25	06:52 (10)			
	17:07	121	15:55 (19)	18:03	44	10:04 (17)	18:52			20:45	18:55 (8)	21:33	21	07:31 (10)	22:05	66	07:58 (10)	
19	08:41		09:26 (22)	07:52		09:20 (17)	06:51		17:29 (8)	06:41	07:20 (11)	05:47	07:07 (10)	05:25	06:53 (10)			
	17:09	124	15:56 (19)	18:05	43	10:03 (17)	18:54	19	17:48 (8)	20:46	63	18:54 (8)	21:35	27	07:34 (10)	22:05	65	07:58 (10)
20	08:40		09:24 (22)	07:50		09:21 (17)	06:49		17:24 (8)	06:39	07:18 (11)	05:46	07:05 (10)	05:25	06:53 (10)			
	17:10	126	15:56 (19)	18:06	41	10:02 (17)	18:56	27	17:51 (8)	20:48	65	18:53 (8)	21:36	31	07:36 (10)	22:05	65	07:58 (10)
21	08:39		09:23 (22)	07:48		09:22 (17)	06:47		17:21 (8)	06:37	07:16 (11)	05:44	07:03 (10)	05:25	06:53 (10)			
	17:12	127	15:57 (19)	18:08	39	10:01 (17)	18:57	33	17:54 (8)	20:50	65	18:51 (8)	21:38	35	07:38 (10)	22:06	65	07:58 (10)
22	08:38		09:22 (22)	07:46		08:24 (16)	06:44		17:19 (8)	06:35	07:14 (11)	05:43	07:02 (10)	05:26	06:53 (10)			
	17:14	129	15:58 (19)	18:10	42	10:00 (17)	18:59	37	17:56 (8)	20:51	66	18:50 (8)	21:39	38	07:40 (10)	22:06	65	07:58 (10)
23	08:36		09:22 (22)	07:44		08:22 (16)	06:42		17:16 (8)	06:33	07:13 (11)	05:42	07:01 (10)	05:26	06:54 (10)			
	17:16	128	15:57 (19)	18:12	45	09:59 (17)	19:01	41	17:57 (8)	20:53	64	18:48 (8)	21:40	41	07:42 (10)	22:06	65	07:59 (10)
24	08:35		09:22 (22)	07:42		08:19 (16)	06:40		17:15 (8)	06:31	07:11 (11)	05:41	07:00 (10)	05:26	06:53 (10)			
	17:17	127	15:58 (19)	18:14	45	09:56 (17)	19:02	44	17:59 (8)	20:55	63	18:46 (8)	21:42	43	07:43 (10)	22:06	66	07:59 (10)
25	08:34		09:22 (22)	07:40		08:17 (16)	06:37		17:13 (8)	06:29	07:10 (11)	05:39	06:59 (10)	05:26	06:53 (10)			
	17:19	126	15:58 (19)	18:15	46	09:55 (17)	19:04	47	18:00 (8)	20:56	59	18:43 (8)	21:43	45	07:44 (10)	22:06	66	07:59 (10)
26	08:33		09:23 (22)	07:38		08:15 (16)	06:35		17:11 (8)	06:27	07:04 (5)	05:38	06:58 (10)	05:27	06:54 (10)			
	17:21	125	15:59 (19)	18:17	44	09:52 (17)	19:06	50	18:01 (8)	20:58	56	18:40 (8)	21:44	47	07:45 (10)	22:06	66	08:00 (10)
27	08:31		09:23 (22)	07:36		08:13 (16)	06:33		17:10 (8)	06:25	07:02 (5)	05:37	06:57 (10)	05:27	06:54 (10)			
	17:22	124	15:58 (19)	18:19	41	09:49 (17)	19:08	52	18:02 (8)	21:00	48	18:34 (8)	21:46	49	07:46 (10)	22:06	65	07:59 (10)
28	08:30		09:24 (22)	07:33		08:10 (16)	06:30		17:09 (8)	06:23	07:00 (5)	05:36	06:56 (10)	05:28	06:55 (10)			
	17:24	123	15:59 (19)	18:21	27	08:37 (16)	19:09	54	18:03 (8)	21:01	45	07:45 (11)	21:47	51	07:47 (10)	22:06	65	08:00 (10)
29	08:29		09:24 (22)			07:28			18:08 (8)	06:21	06:59 (5)	05:35	06:55 (10)	05:28	06:55 (10)			
	17:26	122	15:59 (19)			20:11	55	19:03 (8)	21:03	47	07:46 (11)	21:48	53	07:48 (10)	22:06	64	07:59 (10)	
30	08:27		09:24 (17)			07:26			18:07 (8)	06:19	06:57 (5)	05:34	06:54 (10)	05:29	06:56 (10)			
	17:28	120	15:58 (19)			20:13	56	19:03 (8)	21:05	48	07:45 (11)	21:49	54	07:48 (10)	22:06	64	08:00 (10)	
31	08:26		09:24 (17)			07:24			18:06 (8)			05:33	06:53 (10)					
	17:30	119	15:59 (19)			20:14	58	19:04 (8)			21:50	56	07:49 (10)					
Potential sun hours	260		278			367		416		484		497						
Total, worst case	3484		1851			873		1836		1400		1903						
Sun reduction	0,18		0,27			0,30		0,38		0,43		0,38						
Oper. time red.	0,99		0,99			0,99		0,99		0,99		0,99						
Wind dir. red.	0,67		0,60			0,60		0,62		0,64		0,66						
Total reduction	0,12		0,16			0,18		0,24		0,27		0,25						
Total, real	431		296			156		435		382		474						

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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Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 2

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: A - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (22)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		06:55 (10)	06:06	06:58 (5)	06:55	07:45 (12)	07:43	08:56 (16)	07:36	08:19 (23)	08:27
	22:05	64	07:59 (10)	21:34	50	07:50 (11)	20:33	64	19:01 (8)	19:24	7	09:03 (16)
2	05:30		06:56 (10)	06:07	06:58 (5)	06:56	07:41 (12)	07:45	08:52 (16)	07:38	85	15:19 (19)
	22:05	64	08:00 (10)	21:32	52	07:51 (11)	20:30	70	19:00 (8)	19:21	15	09:07 (16)
3	05:31		06:57 (10)	06:09	06:57 (5)	06:58	07:39 (12)	07:46	08:50 (16)	07:40	86	15:21 (19)
	22:05	63	08:00 (10)	21:31	55	07:52 (11)	20:28	74	19:00 (8)	19:19	19	09:09 (16)
4	05:32		06:57 (10)	06:10	06:56 (5)	07:00	07:38 (12)	07:48	08:47 (16)	07:42	88	15:23 (19)
	22:04	62	07:59 (10)	21:29	56	07:52 (11)	20:26	76	19:00 (8)	19:17	22	09:09 (16)
5	05:32		06:58 (10)	06:12	06:56 (5)	07:01	07:40 (12)	07:50	08:46 (16)	07:43	88	15:24 (19)
	22:04	61	07:59 (10)	21:27	57	07:53 (11)	20:24	75	19:00 (8)	19:15	25	09:11 (16)
6	05:33		06:58 (10)	06:13	06:55 (5)	07:03	07:41 (12)	07:51	08:45 (16)	07:45	87	15:25 (19)
	22:03	61	07:59 (10)	21:26	58	07:53 (11)	20:21	73	18:59 (8)	19:12	27	09:12 (16)
7	05:34		06:59 (10)	06:15	06:57 (5)	07:04	07:43 (12)	07:53	08:44 (16)	07:47	101	15:26 (19)
	22:03	61	08:00 (10)	21:24	57	07:54 (11)	20:19	72	18:59 (8)	19:10	28	09:12 (16)
8	05:35		07:00 (10)	06:16	06:58 (5)	07:06	07:44 (12)	07:55	08:43 (16)	07:49	108	15:27 (19)
	22:02	59	07:59 (10)	21:22	55	07:53 (11)	20:17	70	18:58 (8)	19:08	29	09:12 (16)
9	05:36		06:59 (10)	06:18	07:00 (5)	07:08	07:46 (12)	07:56	08:43 (16)	07:51	111	15:28 (19)
	22:02	59	07:58 (10)	21:20	54	07:54 (11)	20:14	68	18:58 (8)	19:06	29	09:12 (16)
10	05:37		07:00 (10)	06:19	07:01 (5)	07:09	07:47 (12)	07:58	08:42 (16)	07:52	116	15:29 (19)
	22:01	58	07:58 (10)	21:18	53	07:54 (11)	20:12	65	18:57 (8)	19:03	30	09:12 (16)
11	05:38		07:01 (10)	06:21	07:02 (5)	07:11	07:49 (12)	08:00	08:42 (16)	07:54	116	15:29 (19)
	22:00	57	07:58 (10)	21:16	51	07:53 (11)	20:10	61	18:56 (8)	19:01	30	09:12 (16)
12	05:39		07:02 (10)	06:23	07:04 (5)	07:12	07:50 (11)	08:01	08:41 (16)	07:56	118	15:30 (19)
	21:59	56	07:58 (10)	21:14	50	07:54 (11)	20:08	58	18:56 (8)	18:59	30	09:11 (16)
13	05:40		07:02 (10)	06:24	07:05 (5)	07:14	07:51 (11)	08:03	08:42 (16)	07:58	119	15:30 (19)
	21:58	55	07:57 (10)	21:13	48	07:53 (11)	20:05	56	18:54 (8)	18:57	28	09:10 (16)
14	05:41		07:03 (10)	06:26	07:07 (5)	07:16	07:52 (11)	08:05	08:44 (16)	07:59	121	15:31 (19)
	21:57	54	07:57 (10)	21:11	46	07:53 (11)	20:03	56	18:54 (8)	18:55	36	10:18 (17)
15	05:42		07:04 (10)	06:27	07:08 (5)	07:17	07:53 (11)	08:07	08:46 (16)	08:01	123	15:31 (19)
	21:56	52	07:56 (10)	21:09	44	07:52 (11)	20:01	54	18:52 (8)	18:52	43	10:23 (17)
16	05:44		07:05 (10)	06:29	07:10 (5)	07:19	07:54 (11)	08:08	08:48 (16)	08:03	124	15:31 (19)
	21:55	50	07:55 (10)	21:07	51	18:43 (8)	19:58	52	18:51 (8)	18:50	45	10:25 (17)
17	05:45		07:06 (10)	06:31	07:11 (5)	07:20	07:55 (11)	08:10	08:50 (16)	08:04	125	15:32 (19)
	21:54	48	07:54 (10)	21:05	57	18:47 (8)	19:56	50	18:49 (8)	18:48	47	10:28 (17)
18	05:46		07:08 (10)	06:32	07:17 (11)	07:22	07:56 (11)	08:12	08:51 (16)	08:06	126	15:32 (19)
	21:53	46	07:54 (10)	21:03	60	18:50 (8)	19:54	48	18:48 (8)	18:46	45	10:28 (17)
19	05:47		07:09 (10)	06:34	07:17 (11)	07:24	07:57 (11)	08:13	08:53 (16)	08:08	127	15:32 (19)
	21:52	44	07:53 (10)	21:01	63	18:52 (8)	19:51	45	18:47 (8)	18:44	45	10:30 (17)
20	05:49		07:10 (10)	06:35	07:18 (11)	07:25	07:58 (11)	08:15	08:55 (16)	08:10	128	15:32 (19)
	21:51	42	07:52 (10)	20:58	65	18:54 (8)	19:49	42	18:44 (8)	18:42	41	10:31 (17)
21	05:50		07:11 (10)	06:37	07:19 (11)	07:27	07:59 (11)	08:17	09:52 (17)	08:11	129	15:33 (19)
	21:50	39	07:50 (10)	20:56	67	18:55 (8)	19:47	39	18:43 (8)	18:40	40	10:32 (17)
22	05:51		07:12 (10)	06:39	07:21 (11)	07:28	07:56 (11)	08:19	09:51 (17)	08:13	127	15:33 (19)
	21:49	37	07:49 (10)	20:54	65	18:56 (8)	19:44	34	18:39 (8)	18:38	42	10:33 (17)
23	05:53		07:14 (10)	06:40	07:22 (11)	07:30	07:58 (11)	08:20	09:51 (17)	08:15	126	15:33 (19)
	21:47	33	07:47 (10)	20:52	65	18:57 (8)	19:42	29	18:37 (8)	18:36	43	10:34 (17)
24	05:54		07:17 (10)	06:42	07:24 (11)	07:32	07:59 (11)	08:22	09:50 (17)	08:16	124	15:32 (19)
	21:46	29	07:46 (10)	20:50	63	18:58 (8)	19:40	22	18:33 (8)	18:34	44	10:34 (17)
25	05:55		07:19 (10)	06:43	07:28 (11)	07:33	07:59 (11)	08:24	09:49 (17)	08:18	121	15:32 (19)
	21:45	24	07:43 (10)	20:48	56	18:58 (8)	19:37	11	18:27 (8)	17:32	46	09:35 (17)
26	05:57		07:22 (10)	06:45	18:09 (8)	07:35	18:09 (8)	07:35	09:49 (17)	08:19	120	15:32 (19)
	21:43	20	07:42 (11)	20:46	50	18:59 (8)	19:35	17:30	09:35 (17)	16:42	119	15:33 (19)
27	05:58		07:27 (11)	06:47	18:07 (8)	07:37	18:07 (8)	07:37	09:23 (23)	08:21	116	15:33 (19)
	21:42	18	07:45 (11)	20:44	52	18:59 (8)	19:33	17:28	09:35 (17)	16:41	116	15:33 (19)
28	06:00		07:04 (5)	06:48	18:06 (8)	07:38	18:06 (8)	07:38	08:21 (23)	08:22	113	15:32 (19)
	21:40	30	07:46 (11)	20:41	54	19:00 (8)	19:31	17:26	09:36 (17)	16:41	113	15:32 (19)
29	06:01		07:02 (5)	06:50	18:05 (8)	07:40	18:05 (8)	07:40	08:19 (23)	08:24	110	15:32 (19)
	21:39	37	07:47 (11)	20:39	55	19:00 (8)	19:28	17:24	09:36 (17)	16:40	110	15:32 (19)
30	06:03		07:01 (5)	06:51	18:04 (8)	07:41	18:04 (8)	07:41	08:18 (23)	08:25	109	15:33 (19)
	21:37	42	07:49 (11)	20:37	57	19:01 (8)	19:26	17:22	09:36 (17)	16:39	109	15:33 (19)
31	06:04		06:59 (5)	06:53	18:03 (8)		18:03 (8)		08:17 (23)			16:43
	21:36	46	07:49 (11)	20:35	57	19:00 (8)		17:20	15:15 (19)			16:43
Potential sun hours	501		453		381		332		267		245	
Total, worst case	1471		1723		1364		1206		3411		2789	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99	
Wind dir. red.	0,65		0,62		0,62		0,56		0,65		0,69	
Total reduction	0,26		0,26		0,22		0,17		0,14		0,11	
Total, real	379		452		302		205		489		311	

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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Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 3

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:51		09:58 (21)	08:24		09:06 (24)	07:31		08:08 (23)	07:21		07:57 (16)	06:17		08:11 (17)	05:32		06:16 (5)
	16:44	95	13:36 (20)	17:31	121	13:49 (20)	18:23	35	08:45 (22)	20:16	237	18:21 (19)	21:06	180	13:08 (18)	21:52	114	12:26 (18)
2	08:50		09:59 (21)	08:23		09:04 (24)	07:29		08:06 (23)	07:19		07:54 (16)	06:15		08:13 (17)	05:32		06:15 (5)
	16:45	96	13:37 (20)	17:33	123	13:48 (20)	18:24	54	17:04 (19)	20:18	241	18:19 (19)	21:08	175	13:08 (18)	21:53	114	12:25 (18)
3	08:50		09:59 (21)	08:21		09:02 (24)	07:27		08:04 (23)	07:17		07:52 (16)	06:13		08:18 (17)	05:31		06:15 (5)
	16:46	98	13:38 (20)	17:35	123	13:48 (20)	18:26	66	17:09 (19)	20:19	246	18:19 (19)	21:10	166	13:08 (18)	21:54	115	12:24 (18)
4	08:50		09:58 (21)	08:19		09:00 (24)	07:25		08:01 (23)	07:14		07:50 (16)	06:11		10:32 (18)	05:30		06:14 (5)
	16:47	99	13:38 (20)	17:37	125	13:47 (20)	18:28	74	17:12 (19)	20:21	250	18:18 (19)	21:11	155	13:07 (18)	21:55	115	12:23 (18)
5	08:50		09:59 (21)	08:18		08:59 (24)	07:23		07:59 (23)	07:12		07:48 (16)	06:10		10:31 (18)	05:29		06:13 (5)
	16:49	101	13:39 (20)	17:39	124	13:48 (20)	18:30	81	17:14 (19)	20:23	253	18:17 (19)	21:13	155	13:06 (18)	21:56	114	12:21 (18)
6	08:50		09:58 (21)	08:16		08:57 (24)	07:20		07:57 (23)	07:10		07:46 (16)	06:08		10:31 (18)	05:29		06:13 (5)
	16:50	103	13:40 (20)	17:41	124	13:47 (20)	18:31	87	17:17 (19)	20:24	254	18:15 (19)	21:14	155	13:06 (18)	21:57	113	12:21 (18)
7	08:49		09:57 (21)	08:14		08:55 (24)	07:18		07:54 (23)	07:08		07:45 (16)	06:06		10:31 (18)	05:28		06:13 (5)
	16:51	105	13:40 (20)	17:42	123	13:46 (20)	18:33	92	17:18 (19)	20:26	255	18:13 (19)	21:16	153	13:04 (18)	21:58	113	12:21 (18)
8	08:49		09:58 (21)	08:13		08:53 (24)	07:16		07:52 (23)	07:05		07:45 (16)	06:04		10:30 (18)	05:28		06:12 (5)
	16:52	105	13:41 (20)	17:44	121	13:45 (20)	18:35	95	17:20 (19)	20:28	254	18:12 (19)	21:18	153	13:03 (18)	21:58	114	12:20 (18)
9	08:48		09:58 (21)	08:11		08:51 (24)	07:14		07:52 (23)	07:03		07:45 (16)	06:03		10:31 (18)	05:27		06:12 (5)
	16:54	106	13:41 (20)	17:46	118	13:44 (20)	18:37	93	17:21 (19)	20:29	251	18:10 (19)	21:19	151	13:02 (18)	21:59	113	12:19 (18)
10	08:48		09:57 (21)	08:09		08:51 (24)	07:12		07:53 (23)	07:01		07:45 (16)	06:01		10:30 (18)	05:27		06:11 (5)
	16:55	109	13:42 (20)	17:48	113	13:43 (20)	18:38	91	17:23 (19)	20:31	249	18:08 (19)	21:21	151	13:01 (18)	22:00	113	12:18 (18)
11	08:47		09:57 (21)	08:07		08:52 (24)	07:09		07:53 (23)	06:59		07:46 (16)	05:59		10:31 (18)	05:26		06:11 (5)
	16:56	110	13:42 (20)	17:50	106	13:42 (20)	18:40	85	17:23 (19)	20:33	246	18:06 (19)	21:23	149	13:00 (18)	22:01	113	12:18 (18)
12	08:47		09:58 (21)	08:06		08:53 (24)	07:07		07:55 (23)	06:57		07:45 (16)	05:58		10:30 (18)	05:26		06:11 (5)
	16:58	111	13:44 (20)	17:52	97	13:41 (20)	18:42	72	17:24 (19)	20:34	242	18:02 (19)	21:24	148	12:58 (18)	22:02	113	12:18 (18)
13	08:46		09:57 (21)	08:04		08:55 (24)	07:05		07:58 (23)	06:54		07:46 (16)	05:56		10:31 (18)	05:26		06:11 (5)
	16:59	113	13:44 (20)	17:54	86	13:39 (20)	18:44	68	17:25 (19)	20:36	235	17:59 (19)	21:26	146	12:57 (18)	22:02	112	12:17 (18)
14	08:45		09:57 (21)	08:02		09:00 (24)	07:02		10:48 (18)	06:52		07:46 (16)	05:54		10:30 (18)	05:26		06:11 (5)
	17:01	115	13:45 (20)	17:55	69	13:37 (20)	18:45	89	17:25 (19)	20:38	224	17:53 (19)	21:27	145	12:55 (18)	22:03	112	12:17 (18)
15	08:44		09:56 (21)	08:00		10:16 (21)	07:00		10:41 (18)	06:50		07:48 (16)	05:53		10:30 (18)	05:25		06:11 (5)
	17:02	115	13:44 (20)	17:57	54	13:35 (20)	18:47	104	17:25 (19)	20:40	213	13:08 (18)	21:29	144	12:54 (18)	22:03	111	12:17 (18)
16	08:44		09:56 (21)	07:58		12:58 (20)	06:58		10:36 (18)	06:48		07:49 (16)	05:51		10:31 (18)	05:25		06:11 (5)
	17:04	117	13:45 (20)	17:59	34	13:32 (20)	18:49	115	17:26 (19)	20:41	214	13:09 (18)	21:30	141	12:52 (18)	22:04	112	12:17 (18)
17	08:43		09:56 (21)	07:56		13:02 (20)	06:56		10:31 (18)	06:46		07:52 (16)	05:50		10:31 (18)	05:25		06:11 (5)
	17:06	119	13:46 (20)	18:01	26	13:28 (20)	18:51	126	17:26 (19)	20:43	211	13:09 (18)	21:32	140	12:51 (18)	22:04	112	12:17 (18)
18	08:42		09:57 (21)	07:54		13:07 (20)	06:53		10:28 (18)	06:44		08:01 (17)	05:48		10:30 (18)	05:25		06:11 (5)
	17:07	118	13:46 (20)	18:03	14	13:21 (20)	18:52	132	17:26 (19)	20:45	202	13:09 (18)	21:33	138	12:48 (18)	22:05	112	12:17 (18)
19	08:41		09:57 (21)	07:52			06:51		10:25 (18)	06:41		08:01 (17)	05:47		10:31 (18)	05:25		06:11 (5)
	17:09	120	13:47 (20)	18:05			18:54	140	17:27 (19)	20:46	203	13:10 (18)	21:35	136	12:47 (18)	22:05	112	12:17 (18)
20	08:40		09:56 (21)	07:50		08:28 (22)	06:49		10:21 (18)	06:39		08:01 (17)	05:46		10:31 (18)	05:25		06:11 (5)
	17:10	121	13:47 (20)	18:06	8	08:36 (22)	18:56	146	17:26 (19)	20:48	203	13:10 (18)	21:36	134	12:45 (18)	22:05	111	12:17 (18)
21	08:39		09:56 (21)	07:48		08:26 (22)	06:47		10:19 (18)	06:37		08:02 (17)	05:44		10:31 (18)	05:25		06:11 (5)
	17:12	122	13:47 (20)	18:08	13	08:39 (22)	18:57	150	17:26 (19)	20:50	201	13:10 (18)	21:38	132	12:43 (18)	22:06	111	12:17 (18)
22	08:38		09:57 (21)	07:46		08:24 (22)	06:44		10:16 (18)	06:35		08:02 (17)	05:43		10:32 (18)	05:26		06:11 (5)
	17:14	122	13:48 (20)	18:10	17	08:41 (22)	18:59	156	17:26 (19)	20:51	201	13:10 (18)	21:39	130	12:42 (18)	22:06	111	12:17 (18)
23	08:36		09:56 (21)	07:44		08:22 (22)	06:42		10:13 (18)	06:33		08:02 (17)	05:42		10:32 (18)	05:26		06:12 (5)
	17:16	123	13:48 (20)	18:12	20	08:42 (22)	19:01	161	17:26 (19)	20:53	200	13:10 (18)	21:40	128	12:40 (18)	22:06	111	12:18 (18)
24	08:35		09:57 (21)	07:42		08:19 (22)	06:40		10:11 (18)	06:31		08:03 (17)	05:41		10:32 (18)	05:26		06:12 (5)
	17:17	123	13:49 (20)	18:14	23	08:42 (22)	19:02	165	17:26 (19)	20:55	199	13:10 (18)	21:42	126	12:38 (18)	22:06	112	12:18 (18)
25	08:34		09:56 (21)	07:40		08:17 (22)	06:37		10:09 (18)	06:29		08:04 (17)	05:39		10:32 (18)	05:26		06:12 (5)
	17:19	123	13:48 (20)	18:15	26	08:43 (22)	19:04	170	17:26 (19)	20:56	198	13:10 (18)	21:43	124	12:36 (18)	22:06	112	12:18 (18)
26	08:33		09:57 (21)	07:38		08:15 (22)	06:35		10:07 (18)	06:27		08:04 (17)	05:38		10:32 (18)	05:27		06:13 (5)
	17:21	123	13:49 (20)	18:17	29	08:44 (22)	19:06	171	17:24 (19)	20:58	196	13:10 (18)	21:44	123	12:35 (18)	22:06	112	12:19 (18)
27	08:31		09:57 (21)	07:36		08:15 (22)	06:33		10:05 (18)	06:25		08:05 (17)	05:37		10:33 (18)	05:27		06:13 (5)
	17:22	123	13:49 (20)	18:19	30	08:45 (22)	19:08	174	17:24 (19)	21:00	194	13:09 (18)	21:46	120	12:33 (18)	22:06	111	12:19 (18)
28	08:30		09:58 (21)	07:33		08:14 (22)	06:30		07:27 (17)	06:23		08:06 (17)	05:36		10:33 (18)	05:28		06:14 (5)
	17:24	122	13:49 (20)	18:21	30	08:44 (22)	19:09	191	17:24 (19)	21:01	191	13:09 (18)	21:47	118	12:31 (18)	22:06	112	12:20 (18)
29	08:29		09:57 (21)				07:28		08:23 (17)	06:21		08:08 (17)	05:35		10:33 (18)	05:28		06:14 (5)
	17:26	123	13:49 (20)				20:11	202	18:24 (19)	21:03	188	13:09 (18)	21:48	117	12:30 (18)	22:06	112	12:20 (18)
30	08:27		09:57 (21)				07:26		08:01 (16)	06:19		08:09 (17)	05:34		10:33 (18)	05:29		06:15 (5)
	17:28	123	13:49 (20)				20:13	217	18:22 (19)	21:05	185	13:09 (18)	21:49	115	12:28 (18)	22:06	112	12:22 (18)
31	08:26		09:58 (21)				07:24		07:59 (16)				05:33		06:16 (5)			
	17:30	121	13:49 (20)				20:14	229	18:22 (19)				21:50	116	12:27 (18)			
Potential sun hours	260			278			367			415			484			497		
Total, worst case	3524			1897			3831			6636			4364			3374		
Sun reduction	0.18			0.27			0.30			0.38			0.43			0.38		
Oper. time red.	0.99			0.99			0.99			0.99			0.99			0.99		
Wind dir. red.	0.65			0.64			0.61			0.58			0.56			0.58		
Total reduction	0.12			0.17			0.18			0.22			0.24			0.22		
Total, real	425			325			703			1483			105					

Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 4

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: B - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (23)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:30		06:15 (5)	06:06	10:41 (18)	06:55	07:44 (16)	07:43	08:35 (23)	07:36	08:20 (24)	08:27
	22:05	113	12:22 (18)	21:34	13:09 (18)	20:33	18:05 (19)	19:24	18:03 (19)	17:18	13:13 (20)	16:38
2	05:30		06:16 (5)	06:07	10:41 (18)	06:56	07:43 (16)	07:45	08:32 (23)	07:38	08:21 (24)	08:28
	22:05	112	12:23 (18)	21:32	13:11 (18)	20:30	18:06 (19)	19:21	18:02 (19)	17:16	13:14 (20)	16:38
3	05:31		06:17 (5)	06:09	10:41 (18)	06:58	07:43 (16)	07:46	08:31 (23)	07:40	08:23 (24)	08:30
	22:05	113	12:24 (18)	21:31	13:12 (18)	20:28	18:08 (19)	19:19	18:01 (19)	17:15	13:15 (20)	16:37
4	05:32		06:17 (5)	06:10	10:40 (18)	07:00	07:42 (16)	07:48	08:29 (23)	07:42	08:25 (24)	08:31
	22:04	112	12:24 (18)	21:29	13:12 (18)	20:26	18:09 (19)	19:17	17:59 (19)	17:13	13:16 (20)	16:36
5	05:32		06:18 (5)	06:12	10:41 (18)	07:01	07:42 (16)	07:50	08:28 (23)	07:43	08:27 (24)	08:32
	22:04	113	12:26 (18)	21:27	13:14 (18)	20:24	18:10 (19)	19:15	17:57 (19)	17:11	13:17 (20)	16:36
6	05:33		06:19 (5)	06:13	10:40 (18)	07:03	07:42 (16)	07:51	08:30 (23)	07:45	08:29 (24)	08:34
	22:03	114	12:27 (18)	21:26	13:14 (18)	20:21	18:11 (19)	19:12	17:56 (19)	17:09	13:18 (20)	16:36
7	05:34		06:20 (5)	06:15	10:41 (18)	07:04	07:43 (16)	07:53	08:32 (23)	07:47	08:31 (24)	08:35
	22:03	114	12:28 (18)	21:24	13:15 (18)	20:19	18:12 (19)	19:10	17:54 (19)	17:08	13:18 (20)	16:35
8	05:35		06:21 (5)	06:16	10:41 (18)	07:06	07:44 (16)	07:55	08:33 (23)	07:49	08:33 (24)	08:36
	22:02	114	12:30 (18)	21:22	13:15 (18)	20:17	18:12 (19)	19:08	17:51 (19)	17:06	13:19 (20)	16:35
9	05:36		06:21 (5)	06:18	10:41 (18)	07:08	07:46 (16)	07:56	08:35 (23)	07:51	08:35 (24)	08:37
	22:01	114	12:30 (18)	21:20	13:16 (18)	20:14	18:13 (19)	19:06	17:48 (19)	17:04	13:19 (20)	16:35
10	05:37		06:22 (5)	06:19	08:25 (17)	07:09	07:47 (16)	07:58	08:37 (23)	07:52	08:37 (24)	08:38
	22:01	115	12:32 (18)	21:18	13:16 (18)	20:12	18:13 (19)	19:03	17:45 (19)	17:03	13:20 (20)	16:34
11	05:38		06:23 (5)	06:21	08:21 (17)	07:11	07:49 (16)	08:00	08:39 (23)	07:54	09:29 (21)	08:39
	22:00	115	12:33 (18)	21:16	13:16 (18)	20:10	18:13 (19)	19:01	17:41 (19)	17:01	13:20 (20)	16:34
12	05:39		06:24 (5)	06:23	08:19 (17)	07:12	07:51 (16)	08:01	08:40 (23)	07:56	09:29 (21)	08:40
	21:59	115	12:34 (18)	21:14	13:17 (18)	20:08	18:14 (19)	18:59	17:32 (19)	17:00	13:21 (20)	16:34
13	05:40		10:41 (18)	06:24	08:17 (17)	07:14	07:52 (16)	08:03	08:42 (23)	07:58	09:29 (21)	08:41
	21:58	115	12:36 (18)	21:13	13:17 (18)	20:05	18:13 (19)	18:57	09:18 (22)	16:58	13:21 (20)	16:34
14	05:41		10:41 (18)	06:26	08:15 (17)	07:16	08:12 (17)	08:05	08:47 (22)	07:59	09:29 (21)	08:42
	21:57	117	12:38 (18)	21:11	13:17 (18)	20:03	18:14 (19)	18:55	09:17 (22)	16:57	13:21 (20)	16:34
15	05:42		10:41 (18)	06:27	08:13 (17)	07:17	08:15 (17)	08:07	08:47 (22)	08:01	09:30 (21)	08:43
	21:56	118	12:39 (18)	21:09	13:17 (18)	20:01	18:13 (19)	18:52	09:17 (22)	16:55	13:22 (20)	16:34
16	05:44		10:41 (18)	06:29	08:12 (17)	07:19	10:54 (18)	08:08	08:48 (22)	08:03	09:30 (21)	08:44
	21:55	120	12:41 (18)	21:07	13:17 (18)	19:58	18:14 (19)	18:50	09:16 (22)	16:54	13:22 (20)	16:34
17	05:45		10:41 (18)	06:31	08:11 (17)	07:20	10:55 (18)	08:10	08:50 (22)	08:04	09:30 (21)	08:45
	21:54	121	12:42 (18)	21:05	13:16 (18)	19:56	18:13 (19)	18:48	09:15 (22)	16:53	13:22 (20)	16:34
18	05:46		10:42 (18)	06:32	08:10 (17)	07:22	10:56 (18)	08:12	08:51 (22)	08:06	09:31 (21)	08:46
	21:53	123	12:45 (18)	21:03	13:16 (18)	19:54	18:13 (19)	18:46	09:13 (22)	16:51	13:23 (20)	16:35
19	05:47		10:42 (18)	06:34	08:08 (17)	07:24	10:58 (18)	08:13	08:53 (22)	08:08	09:31 (21)	08:46
	21:52	125	12:47 (18)	21:01	13:16 (18)	19:51	18:13 (19)	18:44	09:12 (22)	16:50	13:23 (20)	16:35
20	05:49		10:41 (18)	06:35	08:08 (17)	07:25	10:59 (18)	08:15	08:55 (22)	08:10	09:32 (21)	08:47
	21:51	128	12:49 (18)	20:58	13:16 (18)	19:49	18:12 (19)	18:42	09:10 (22)	16:49	13:23 (20)	16:35
21	05:50		10:41 (18)	06:37	08:07 (17)	07:27	11:01 (18)	08:17	08:57 (22)	08:11	09:32 (21)	08:48
	21:50	129	12:50 (18)	20:56	13:15 (18)	19:47	18:12 (19)	18:40	09:08 (22)	16:48	13:23 (20)	16:36
22	05:51		10:41 (18)	06:39	08:06 (17)	07:28	11:02 (18)	08:19	08:59 (22)	08:13	09:32 (21)	08:48
	21:49	131	12:52 (18)	20:54	13:15 (18)	19:44	18:11 (19)	18:38	09:05 (22)	16:46	13:23 (20)	16:36
23	05:53		10:42 (18)	06:40	08:05 (17)	07:30	11:05 (18)	08:20		08:14	09:33 (21)	08:49
	21:47	133	12:55 (18)	20:52	13:14 (18)	19:42	18:11 (19)	18:36		16:45	13:23 (20)	16:37
24	05:54		10:41 (18)	06:42	08:05 (17)	07:32	11:07 (18)	08:22	13:36 (20)	08:16	09:34 (21)	08:49
	21:46	135	12:56 (18)	20:50	13:13 (18)	19:40	18:10 (19)	18:34	13:54 (20)	16:44	13:23 (20)	16:37
25	05:55		10:41 (18)	06:43	08:04 (17)	07:33	11:09 (18)	07:24	12:30 (20)	08:18	09:34 (21)	08:49
	21:45	137	12:58 (18)	20:48	13:12 (18)	19:37	18:09 (19)	17:32	12:59 (20)	16:43	13:24 (20)	16:38
26	05:57		10:41 (18)	06:45	07:54 (16)	07:35	11:13 (18)	07:26	12:27 (20)	08:19	09:35 (21)	08:50
	21:43	139	13:00 (18)	20:46	13:12 (18)	19:35	18:09 (19)	17:30	13:02 (20)	16:42	13:24 (20)	16:39
27	05:58		10:42 (18)	06:47	07:51 (16)	07:37	11:15 (18)	07:27	09:45 (21)	08:21	09:36 (21)	08:50
	21:42	140	13:02 (18)	20:44	13:11 (18)	19:33	18:07 (19)	17:28	13:05 (20)	16:41	13:24 (20)	16:39
28	06:00		10:41 (18)	06:48	07:49 (16)	07:38	11:20 (18)	07:29	08:27 (24)	08:22	09:36 (21)	08:50
	21:40	143	13:04 (18)	20:41	13:10 (18)	19:31	18:06 (19)	17:26	13:07 (20)	16:41	13:24 (20)	16:40
29	06:01		10:41 (18)	06:50	07:47 (16)	07:40	11:26 (18)	07:31	08:24 (24)	08:24	09:37 (21)	08:50
	21:39	144	13:05 (18)	20:39	17:54 (19)	19:28	18:06 (19)	17:24	13:09 (20)	16:40	13:24 (20)	16:41
30	06:03		10:41 (18)	06:52	07:46 (16)	07:41	11:36 (18)	07:33	08:22 (24)	08:25	09:39 (21)	08:51
	21:37	146	13:07 (18)	20:37	18:00 (19)	19:26	18:04 (19)	17:22	13:11 (20)	16:39	13:25 (20)	16:42
31	06:04		10:41 (18)	06:53	07:45 (16)			07:35	08:21 (24)		08:51	09:58 (21)
	21:36	147	13:08 (18)	20:35	18:02 (19)			17:20	13:12 (20)		16:43	13:35 (20)
Potential sun hours	501		453		381		332		267		245	
Total, worst case	3855		5805		5689		1674		3611		2914	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99	
Wind dir. red.	0,57		0,57		0,60		0,62		0,65		0,66	
Total reduction	0,22		0,24		0,22		0,19		0,14		0,11	
Total, real	867		1399		1229		315		514		315	

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 5

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

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Calculated:

21-11-2013 11:42/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January			February			March			April			May			June		
1	08:50		11:30 (34)	08:24		11:48 (34)	07:31		09:01 (35)	07:21		19:06 (12)	06:17		07:33 (15)	05:32		07:38 (15)
	16:44	85	15:39 (31)	17:31	102	16:46 (23)	18:22	25	09:26 (35)	20:16	30	19:36 (12)	21:06	99	20:02 (13)	21:51	142	21:02 (6)
2	08:50		11:31 (34)	08:23		11:49 (34)	07:29		09:04 (35)	07:19		19:04 (12)	06:15		07:32 (15)	05:31		07:39 (15)
	16:45	84	15:40 (31)	17:33	103	16:48 (23)	18:24	20	09:24 (35)	20:18	32	19:36 (12)	21:08	103	20:03 (13)	21:53	140	21:02 (6)
3	08:50		11:31 (34)	08:21		09:12 (35)	07:27		09:07 (35)	07:17		19:04 (12)	06:13		07:31 (15)	05:31		07:39 (15)
	16:46	83	15:39 (31)	17:35	108	16:50 (23)	18:26	13	09:20 (35)	20:19	32	19:36 (12)	21:09	107	20:04 (13)	21:54	140	21:02 (6)
4	08:50		11:31 (34)	08:19		09:07 (35)	07:25		07:14			19:04 (12)	06:11		07:32 (15)	05:30		07:40 (15)
	16:47	84	15:40 (31)	17:37	117	16:52 (23)	18:28		20:21	32	19:36 (12)	21:11	109	20:06 (13)	21:55	138	21:03 (6)	
5	08:50		11:32 (34)	08:18		09:04 (35)	07:22		07:12			19:04 (12)	06:10		07:31 (15)	05:29		07:40 (15)
	16:48	82	15:40 (31)	17:39	122	16:54 (23)	18:30		20:23	31	19:35 (12)	21:13	112	20:07 (13)	21:56	137	21:03 (6)	
6	08:49		11:32 (34)	08:16		09:04 (35)	07:20		07:10			19:04 (12)	06:08		07:31 (15)	05:29		07:41 (15)
	16:50	82	15:40 (31)	17:40	122	16:57 (23)	18:31		20:24	30	19:34 (12)	21:14	114	20:07 (13)	21:57	138	21:03 (6)	
7	08:49		11:32 (34)	08:14		09:02 (35)	07:18		07:08			19:04 (12)	06:06		07:31 (15)	05:28		07:41 (15)
	16:51	80	15:39 (31)	17:42	121	16:59 (23)	18:33		20:26	29	19:33 (12)	21:16	115	20:08 (13)	21:57	136	21:03 (6)	
8	08:49		11:33 (34)	08:13		09:01 (35)	07:16		07:05			19:05 (12)	06:04		07:30 (15)	05:28		07:42 (15)
	16:52	79	15:40 (31)	17:44	118	17:01 (32)	18:35		20:28	28	19:33 (12)	21:18	118	20:09 (13)	21:58	136	21:04 (6)	
9	08:48		11:33 (34)	08:11		08:59 (35)	07:14		07:03			19:06 (12)	06:02		07:31 (15)	05:27		07:43 (15)
	16:54	77	15:39 (31)	17:46	106	17:03 (32)	18:37		20:29	26	19:32 (12)	21:19	118	20:10 (13)	21:59	133	21:04 (6)	
10	08:48		11:34 (34)	08:09		08:59 (35)	07:11		07:01			19:07 (12)	06:01		07:30 (15)	05:27		07:43 (15)
	16:55	75	15:38 (31)	17:48	109	17:05 (32)	18:38		20:31	23	19:30 (12)	21:21	119	20:10 (13)	22:00	132	21:04 (6)	
11	08:47		11:34 (34)	08:07		08:58 (35)	07:09		06:59			19:07 (12)	05:59		07:31 (15)	05:26		07:44 (15)
	16:56	73	15:37 (31)	17:50	111	17:05 (32)	18:40		20:33	21	19:28 (12)	21:22	121	20:11 (13)	22:01	131	21:04 (6)	
12	08:46		11:34 (34)	08:05		08:57 (35)	07:07		06:56			19:09 (12)	05:57		07:30 (15)	05:26		07:44 (15)
	16:58	71	15:46 (33)	17:52	111	17:05 (32)	18:42		20:34	17	19:26 (12)	21:24	122	20:11 (13)	22:01	132	21:05 (6)	
13	08:46		11:34 (34)	08:04		08:57 (35)	07:05		06:54			19:12 (12)	05:56		07:31 (15)	05:26		07:45 (15)
	16:59	77	15:50 (33)	17:53	109	17:05 (32)	18:44		20:36	11	19:23 (12)	21:26	122	20:12 (13)	22:02	129	21:05 (6)	
14	08:45		11:35 (34)	08:02		08:56 (35)	07:02		06:52			08:03 (15)	05:54		07:30 (15)	05:25		07:46 (15)
	17:01	81	15:53 (33)	17:55	110	17:05 (32)	18:45		20:38	10	08:13 (15)	21:27	123	20:12 (13)	22:03	129	21:05 (6)	
15	08:44		11:35 (34)	08:00		08:56 (35)	07:00		06:50			07:57 (15)	05:53		07:31 (15)	05:25		07:46 (15)
	17:02	85	15:55 (33)	17:57	108	17:05 (32)	18:47		20:39	24	20:00 (5)	21:29	121	20:12 (13)	22:03	127	21:05 (6)	
16	08:43		11:36 (34)	07:58		08:56 (35)	06:58		06:48			07:53 (15)	05:51		07:31 (15)	05:25		07:46 (15)
	17:04	88	15:57 (33)	17:59	104	17:04 (32)	18:49		20:41	34	20:01 (5)	21:30	127	20:46 (6)	22:04	127	21:05 (6)	
17	08:43		11:36 (34)	07:56		08:55 (35)	06:56		06:46			07:50 (15)	05:50		07:31 (15)	05:25		07:46 (15)
	17:05	91	15:59 (33)	18:01	101	17:03 (32)	18:50		20:43	43	20:03 (5)	21:32	132	20:47 (6)	22:04	127	21:05 (6)	
18	08:42		11:37 (34)	07:54		08:55 (35)	06:53		06:43			07:48 (15)	05:48		07:31 (15)	05:25		07:47 (15)
	17:07	92	16:01 (33)	18:03	96	17:02 (32)	18:52		20:44	50	20:05 (5)	21:33	134	20:48 (6)	22:05	127	21:06 (6)	
19	08:41		11:38 (34)	07:52		08:55 (35)	06:51		06:41			07:46 (15)	05:47		07:32 (15)	05:25		07:48 (15)
	17:09	95	16:03 (33)	18:04	88	17:00 (32)	18:54		20:46	55	20:06 (5)	21:35	136	20:50 (6)	22:05	125	21:06 (6)	
20	08:40		11:38 (34)	07:50		08:55 (35)	06:49		06:39			07:44 (15)	05:46		07:32 (15)	05:25		07:48 (15)
	17:10	95	16:03 (33)	18:06	80	16:58 (32)	18:56		20:48	61	20:08 (5)	21:36	139	20:51 (6)	22:05	126	21:06 (6)	
21	08:39		11:39 (34)	07:48		08:55 (35)	06:46		06:37			07:43 (15)	05:44		07:33 (15)	05:25		07:48 (15)
	17:12	97	16:05 (33)	18:08	69	16:55 (32)	18:57		20:50	65	20:09 (5)	21:37	139	20:52 (6)	22:06	126	21:06 (6)	
22	08:37		11:40 (34)	07:46		08:56 (35)	06:44		06:35			07:41 (15)	05:43		07:32 (15)	05:25		07:48 (15)
	17:14	98	16:06 (33)	18:10	49	15:57 (33)	18:59		20:51	70	20:11 (5)	21:39	142	20:53 (6)	22:06	126	21:06 (6)	
23	08:36		11:40 (34)	07:44		08:55 (35)	06:42		06:33			07:40 (15)	05:42		07:33 (15)	05:26		07:49 (15)
	17:15	99	16:07 (33)	18:12	39	09:34 (35)	19:01		20:53	73	20:12 (5)	21:40	143	20:54 (6)	22:06	125	21:07 (6)	
24	08:35		11:41 (34)	07:42		08:56 (35)	06:40		06:31			07:38 (15)	05:40		07:33 (15)	05:26		07:49 (15)
	17:17	100	16:08 (33)	18:13	37	09:33 (35)	19:02		20:55	77	20:14 (5)	21:42	142	20:55 (6)	22:06	126	21:07 (6)	
25	08:34		11:41 (34)	07:40		08:57 (35)	06:37		18:17 (12)	06:29		07:37 (15)	05:39		07:34 (15)	05:26		07:48 (15)
	17:19	101	16:09 (33)	18:15	35	09:32 (35)	19:04	9	18:26 (12)	20:56	77	20:13 (5)	21:43	143	20:56 (6)	22:06	127	21:07 (6)
26	08:33		11:42 (34)	07:38		08:58 (35)	06:35		18:13 (12)	06:27		07:36 (15)	05:38		07:34 (15)	05:27		07:49 (15)
	17:21	101	16:10 (33)	18:17	34	09:32 (35)	19:06	14	18:27 (12)	20:58	77	20:12 (5)	21:44	143	20:57 (6)	22:06	127	21:08 (6)
27	08:31		11:43 (34)	07:35		08:59 (35)	06:33		18:11 (12)	06:25		07:35 (15)	05:37		07:36 (15)	05:27		07:48 (15)
	17:22	100	16:11 (33)	18:19	31	09:30 (35)	19:07	18	18:29 (12)	21:00	88	20:11 (5)	21:45	144	20:59 (6)	22:06	128	21:08 (6)
28	08:30		11:43 (34)	07:33		08:59 (35)	06:30		18:10 (12)	06:23		07:34 (15)	05:36		07:36 (15)	05:28		07:48 (15)
	17:24	100	16:11 (33)	18:21	29	09:28 (35)	19:09	21	18:31 (12)	21:01	96	20:09 (5)	21:47	144	21:00 (6)	22:06	129	21:07 (6)
29	08:28		11:45 (34)			07:28			19:08 (12)	06:21		07:33 (15)	05:35		07:36 (15)	05:28		07:48 (15)
	17:26	100	16:12 (33)			20:11		24	19:32 (12)	21:03	98	20:06 (5)	21:48	145	21:01 (6)	22:06	130	21:08 (6)
30	08:27		11:45 (34)			07:26			19:07 (12)	06:19		07:34 (15)	05:34		07:37 (15)	05:29		07:49 (15)
	17:28	102	16:41 (23)			20:12		27	19:34 (12)	21:05	94	20:00 (13)	21:49	143	21:01 (6)	22:06	129	21:09 (6)
31	08:26		11:46 (34)			07:23			19:06 (12)			05:33			07:37 (15)			
	17:30	102	16:43 (23)			20:14		30	19:36 (12)			21:50		143	21:01 (6)			
Potential sun hours	260			278			367			416			484			497		
Total, worst case		2759		2469			201			1434			3962			3925		
Sun reduction		0,18		0,27			0,30			0,38			0,43			0,38		
Oper. time red.		0,99		0,99			0,99			0,99			0,99			0,99		
Wind dir. red.		0,66		0,65			0,60			0,60			0,58			0,57		
Total reduction		0,12		0,17			0,18			0,23			0,25			0,22		
Total, real		339		431			36			333			993			863		

Project:

Alternatief: VKA overnachtingsplaatsen

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Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: C - Shadow Receptor: 0,1 x 0,1 Azimuth: 0,0° Slope: 0,0° (24)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December	
1	05:29		07:48 (15)	06:05	07:41 (15)	06:55	19:07 (12)	07:43	07:36		08:28 (35)	08:27
	22:05	131	21:08 (6)	21:34	20:21 (13)	20:32	19:28 (12)	19:24	17:18	110	16:34 (32)	16:38
2	05:30		07:48 (15)	06:07	07:41 (15)	06:56	19:05 (12)	07:45	07:38		08:29 (35)	08:28
	22:05	133	21:09 (6)	21:32	20:21 (13)	20:30	19:28 (12)	19:21	17:16	106	16:32 (32)	16:38
3	05:31		07:47 (15)	06:08	07:41 (15)	06:58	19:04 (12)	07:46	07:40		08:30 (35)	08:29
	22:05	133	21:08 (6)	21:31	20:20 (13)	20:28	19:30 (12)	19:19	17:14	118	16:30 (32)	16:37
4	05:31		07:48 (15)	06:10	07:40 (15)	06:59	19:02 (12)	07:48	07:42		08:32 (35)	08:31
	22:04	134	21:09 (6)	21:29	20:19 (13)	20:26	19:30 (12)	19:17	17:13	122	16:28 (23)	16:36
5	05:32		07:48 (15)	06:12	07:41 (15)	07:01	19:01 (12)	07:50	07:43		08:33 (35)	08:32
	22:04	135	21:09 (6)	21:27	20:19 (13)	20:23	19:30 (12)	19:14	17:11	123	16:26 (23)	16:36
6	05:33		07:48 (15)	06:13	07:40 (15)	07:03	19:00 (12)	07:51	07:45		08:36 (35)	08:33
	22:03	136	21:10 (6)	21:25	20:18 (13)	20:21	19:30 (12)	19:12	17:09	120	16:24 (23)	16:35
7	05:34		07:48 (15)	06:15	07:41 (15)	07:04	19:00 (12)	07:53	07:47		08:38 (35)	08:35
	22:03	137	21:10 (6)	21:24	20:17 (13)	20:19	19:30 (12)	19:10	17:07	116	16:22 (23)	16:35
8	05:35		07:46 (15)	06:16	07:41 (15)	07:06	18:58 (12)	07:55	07:49		08:43 (35)	08:36
	22:02	139	21:09 (6)	21:22	20:16 (13)	20:17	19:30 (12)	19:08	17:06	107	16:20 (23)	16:35
9	05:36		07:46 (15)	06:18	07:40 (15)	07:07	18:58 (12)	07:56	07:50		11:20 (34)	08:37
	22:01	140	21:10 (6)	21:20	20:14 (13)	20:14	19:30 (12)	19:05	17:04	103	16:19 (23)	16:34
10	05:37		07:46 (15)	06:19	07:41 (15)	07:09	18:58 (12)	07:58	07:52		11:19 (34)	08:38
	22:01	141	21:10 (6)	21:18	20:13 (13)	20:12	19:29 (12)	19:03	7	09:51 (35)	17:03	102
11	05:38		07:46 (15)	06:21	07:41 (15)	07:11	18:58 (12)	08:00	09:38 (35)	07:54	11:18 (34)	08:39
	22:00	143	21:10 (6)	21:16	20:11 (13)	20:10	19:29 (12)	19:01	17	09:55 (35)	17:01	102
12	05:39		07:46 (15)	06:23	07:41 (15)	07:12	18:57 (12)	08:01	09:36 (35)	07:56	11:17 (34)	08:40
	21:59	141	21:10 (6)	21:14	20:10 (13)	20:07	19:27 (12)	18:59	22	09:58 (35)	16:59	101
13	05:40		07:45 (15)	06:24	07:41 (15)	07:14	18:58 (12)	08:03	09:34 (35)	07:57	11:16 (34)	08:41
	21:58	143	21:10 (6)	21:12	20:10 (5)	20:05	19:26 (12)	18:57	26	10:00 (35)	16:58	100
14	05:41		07:45 (15)	06:26	07:42 (15)	07:15	18:59 (12)	08:05	09:32 (35)	07:59	11:16 (34)	08:42
	21:57	144	21:10 (6)	21:10	20:15 (5)	20:03	19:24 (12)	18:54	30	10:02 (35)	16:57	100
15	05:42		07:45 (15)	06:27	07:42 (15)	07:17	18:59 (12)	08:06	09:31 (35)	08:01	11:15 (34)	08:43
	21:56	143	21:09 (6)	21:08	20:17 (5)	20:01	19:21 (12)	18:52	32	10:03 (35)	16:55	101
16	05:43		07:44 (15)	06:29	07:43 (15)	07:19	19:00 (12)	08:08	09:30 (35)	08:03	11:15 (34)	08:44
	21:55	144	21:08 (6)	21:07	20:18 (5)	19:58	19:19 (12)	18:50	34	10:04 (35)	16:54	101
17	05:45		07:44 (15)	06:30	07:43 (15)	07:20	19:01 (12)	08:10	09:28 (35)	08:04	11:15 (34)	08:45
	21:54	144	21:07 (6)	21:04	20:19 (5)	19:56	19:16 (12)	18:48	36	10:04 (35)	16:52	101
18	05:46		07:44 (15)	06:32	07:44 (15)	07:22	19:04 (12)	08:12	09:27 (35)	08:06	11:15 (34)	08:46
	21:53	143	21:06 (6)	21:02	20:20 (5)	19:54	19:14 (12)	18:46	38	10:05 (35)	16:51	100
19	05:47		07:44 (15)	06:34	07:44 (15)	07:23	08:13		09:26 (35)	08:08	11:15 (34)	08:46
	21:52	143	21:06 (6)	21:00	20:19 (5)	19:51	18:44	39	10:05 (35)	16:50	99	15:42 (33)
20	05:48		07:44 (15)	06:35	07:45 (15)	07:25	08:15		09:26 (35)	08:09	11:15 (34)	08:47
	21:51	142	21:05 (6)	20:58	20:17 (5)	19:49	18:42	54	16:29 (33)	16:49	98	15:41 (33)
21	05:50		07:43 (15)	06:37	07:46 (15)	07:27	08:17		09:25 (35)	08:11	11:14 (34)	08:47
	21:50	141	21:04 (6)	20:56	20:15 (5)	19:47	18:40	74	17:27 (32)	16:47	98	15:40 (33)
22	05:51		07:43 (15)	06:38	07:46 (15)	07:28	08:19		09:25 (35)	08:13	11:14 (34)	08:48
	21:48	141	21:03 (6)	20:54	20:13 (5)	19:44	18:38	83	17:30 (32)	16:46	95	15:39 (33)
23	05:52		07:42 (15)	06:40	07:48 (15)	07:30	08:20		09:25 (35)	08:14	11:14 (34)	08:49
	21:47	139	21:01 (6)	20:52	20:11 (5)	19:42	18:35	91	17:31 (32)	16:45	95	15:39 (33)
24	05:54		07:43 (15)	06:42	07:49 (15)	07:32	08:22		09:25 (35)	08:16	11:14 (34)	08:49
	21:46	136	21:01 (6)	20:50	20:09 (5)	19:40	18:33	97	17:32 (32)	16:44	92	15:38 (33)
25	05:55		07:42 (15)	06:43	07:51 (15)	07:33	07:24		08:25 (35)	08:18	11:15 (34)	08:49
	21:44	135	20:59 (6)	20:48	20:07 (5)	19:37	17:31	102	16:33 (32)	16:43	90	15:37 (33)
26	05:57		07:42 (15)	06:45	07:52 (15)	07:35	07:26		08:25 (35)	08:19	11:15 (34)	08:50
	21:43	133	20:58 (6)	20:46	20:05 (5)	19:35	17:29	106	16:34 (32)	16:42	88	15:36 (33)
27	05:58		07:41 (15)	06:47	07:55 (15)	07:36	07:27		08:25 (35)	08:21	11:15 (34)	08:50
	21:42	130	20:56 (6)	20:43	20:03 (5)	19:33	17:27	109	16:35 (32)	16:41	85	15:35 (33)
28	06:00		07:42 (15)	06:48	07:58 (15)	07:38	07:29		08:26 (35)	08:22	11:15 (34)	08:50
	21:40	124	20:56 (6)	20:41	20:01 (5)	19:30	17:26	110	16:35 (32)	16:40	81	15:33 (33)
29	06:01		07:41 (15)	06:50	08:04 (15)	07:40	07:31		08:26 (35)	08:24	11:15 (34)	08:50
	21:39	123	20:23 (13)	20:39	08:13 (15)	19:28	17:24	111	16:35 (32)	16:40	78	15:32 (33)
30	06:02		07:41 (15)	06:51	19:11 (12)	07:41	07:33		08:27 (35)	08:25	11:16 (34)	08:50
	21:37	122	20:22 (13)	20:37	19:23 (12)	19:26	17:22	111	16:35 (32)	16:39	71	15:28 (33)
31	06:04		07:41 (15)	06:53	19:09 (12)		07:34		08:28 (35)		08:50	
	21:36	121	20:22 (13)	20:35	19:26 (12)		17:20	109	16:35 (32)		16:43	86
Potential sun hours	501		453		381		332		267		245	
Total, worst case	4234		2448		462		1438		3003		2586	
Sun reduction	0,40		0,42		0,36		0,31		0,22		0,16	
Oper. time red.	0,99		0,99		0,99		0,99		0,99		0,99	
Wind dir. red.	0,58		0,59		0,61		0,63		0,66		0,66	
Total reduction	0,23		0,25		0,22		0,19		0,15		0,11	
Total, real	976		616		101		277		441		280	

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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Project:

Alternatief: VKA overnachtingsplaatsen

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17-03-2014 15:28 / 7

Licensed user:

Witteveen+Bos

Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:50	08:24	16:22 (31)	07:31	17:27 (23)	07:21
2	16:44	17:31	24 16:46 (31)	18:22	17:43 (23)	20:16
3	08:23	08:23	16:22 (31)	07:29	17:28 (23)	07:19
4	16:45	17:33	26 16:48 (31)	18:24	17:45 (23)	20:18
5	08:50	08:21	16:22 (31)	07:27	17:28 (23)	07:17
6	16:46	17:35	27 16:49 (31)	18:26	17:46 (23)	20:19
7	08:50	08:19	16:22 (31)	07:25	17:29 (23)	07:14
8	16:47	17:37	27 16:49 (31)	18:28	17:44 (23)	20:21
9	08:50	08:18	16:22 (31)	07:22	17:31 (23)	07:12
10	16:48	17:39	27 16:49 (31)	18:30	17:42 (23)	20:23
11	08:49	08:16	16:23 (31)	07:20	17:36 (23)	07:10
12	16:50	17:41	27 16:50 (31)	18:31	17:42 (23)	20:24
13	08:49	08:14	16:24 (31)	07:18	17:37 (23)	07:08
14	16:51	17:42	26 16:50 (31)	18:33	20:26	240
15	08:49	08:13	16:24 (31)	07:16	17:51 (32)	07:05
16	16:52	17:44	25 16:49 (31)	18:35	17:56 (32)	20:28
17	08:48	08:11	16:25 (31)	07:14	17:48 (32)	07:03
18	16:54	17:46	23 16:48 (31)	18:37	17:58 (32)	20:29
19	08:48	08:09	16:26 (31)	07:11	17:45 (32)	07:01
20	16:55	17:48	22 16:48 (31)	18:38	17:59 (32)	20:31
21	08:47	08:07	16:27 (31)	07:09	17:44 (32)	06:59
22	16:56	17:50	19 16:46 (31)	18:40	18:01 (32)	20:33
23	08:46	08:05	16:29 (31)	07:07	17:43 (32)	06:56
24	16:58	17:52	16 16:45 (31)	18:42	18:03 (32)	20:34
25	08:46	08:04	16:31 (31)	07:05	17:41 (32)	06:54
26	16:59	17:53	12 16:43 (31)	18:44	18:05 (32)	20:36
27	08:45	08:02	16:43 (31)	07:02	17:41 (32)	06:52
28	17:01	17:55	18:45	26 18:07 (32)	20:38	252
29	08:44	08:00	07:00	26 17:40 (32)	06:50	252
30	17:02	17:57	18:47	29 18:09 (32)	20:39	252
31	08:43	07:58	06:58	29 17:39 (32)	06:48	252
32	17:04	17:59	18:49	29 18:08 (32)	20:41	253
33	08:43	07:56	06:56	29 12:50 (34)	06:46	253
34	17:05	18:01	18:50	54 18:08 (32)	20:43	252
35	08:42	07:54	06:53	54 12:42 (34)	06:43	252
36	17:07	18:03	18:52	68 18:08 (32)	20:44	250
37	08:41	07:52	06:51	68 12:36 (34)	06:41	250
38	17:09	18:04	18:54	78 18:07 (32)	20:46	249
39	08:40	07:50	06:49	78 12:32 (34)	06:39	249
40	17:10	18:06	18:56	85 18:06 (32)	20:48	245
41	08:39	07:48	06:46	85 12:28 (34)	06:37	245
42	17:12	18:08	18:57	95 18:05 (32)	20:49	243
43	08:37	07:46	06:44	95 12:25 (34)	06:35	243
44	17:14	18:10	18:59	103 18:04 (32)	20:51	240
45	08:36	07:44	06:42	103 12:21 (34)	06:33	240
46	17:15	18:12	2 17:31 (23)	19:01	18:03 (33)	20:53
47	08:35	07:42	17:28 (23)	06:39	12:19 (34)	06:31
48	17:17	3 16:30 (31)	18:13	5 17:33 (23)	19:02	120
49	08:34	16:26 (31)	07:40	5 17:28 (23)	06:37	120
50	17:19	5 16:31 (31)	18:15	7 17:35 (23)	19:04	128
51	08:33	16:25 (31)	07:38	7 17:27 (23)	06:35	128
52	17:21	9 16:34 (31)	18:17	10 17:37 (23)	19:06	135
53	08:31	16:24 (31)	07:35	10 17:27 (23)	06:33	135
54	17:22	11 16:35 (31)	18:19	12 17:39 (23)	19:07	155
55	08:30	16:23 (31)	07:33	12 17:27 (23)	06:30	155
56	17:24	14 16:37 (31)	18:21	14 17:41 (23)	19:09	170
57	08:28	16:23 (31)	07:31	14 17:38 (23)	06:28	170
58	17:26	17 16:40 (31)	07:29	17 17:35 (23)	06:26	183
59	08:27	16:22 (31)	07:28	17 17:24 (23)	06:24	183
60	17:28	19 16:41 (31)	07:26	19 17:26 (23)	06:22	193
61	08:26	16:22 (31)	07:25	19 17:23 (23)	06:21	193
62	17:30	21 16:43 (31)	07:23	21 17:23 (23)	06:19	202
Potential sun hours	260	278	367	415	484	497
Total, worst case	99	351	2134	7038	6130	5238
Sun reduction	0,18	0,27	0,30	0,38	0,43	0,38
Oper. time red.	0,99	0,99	0,99	0,99	0,99	0,99
Wind dir. red.	0,69	0,69	0,66	0,66	0,67	0,69
Total reduction	0,13	0,18	0,20	0,25	0,29	0,26
Total, real	13	64	418	1754	1748	1366

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief: VKA overnachtingsplaatsen

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Witteveen+Bos

Van Twickelostraat 2

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+31 570 69 76 76

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Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen

SHADOW - Calendar

Shadow receptor: D - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (25)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July		August		September		October		November		December			
1	05:29		12:28 (34)	06:05	12:33 (34)	06:55	08:07 (35)	07:43	18:21 (32)	07:36	15:55 (31)	08:27		
	22:05	175	15:23 (34)	21:34	20:50 (5)	20:32	19:07 (33)	19:24	22	18:43 (32)	17:18	22	16:17 (31)	16:38
2	05:30		12:29 (34)	06:07	12:34 (34)	06:56	08:07 (35)	07:45		18:22 (32)	07:38		15:54 (31)	08:28
	22:05	175	15:24 (34)	21:32	20:49 (5)	20:30	19:07 (33)	19:21	19	18:41 (32)	17:16	24	16:18 (31)	16:38
3	05:31		12:28 (34)	06:08	12:34 (34)	06:58	08:07 (35)	07:46		18:22 (32)	07:40		15:54 (31)	08:29
	22:05	175	15:23 (34)	21:31	20:44 (12)	20:28	19:07 (33)	19:19	16	18:38 (32)	17:14	25	16:19 (31)	16:37
4	05:32		12:29 (34)	06:10	12:34 (34)	06:59	08:07 (35)	07:48		18:24 (32)	07:42		15:53 (31)	08:31
	22:04	175	15:24 (34)	21:29	20:43 (12)	20:26	19:06 (33)	19:17	12	18:36 (32)	17:13	26	16:19 (31)	16:36
5	05:32		12:29 (34)	06:12	12:35 (34)	07:01	08:08 (35)	07:50		18:26 (32)	07:43		15:53 (31)	08:32
	22:04	175	15:24 (34)	21:27	20:44 (12)	20:23	19:07 (33)	19:14	8	18:34 (32)	17:11	27	16:20 (31)	16:36
6	05:33		12:30 (34)	06:13	12:34 (34)	07:03	08:07 (35)	07:51		18:31 (32)	07:45		15:53 (31)	08:33
	22:03	174	15:24 (34)	21:25	20:42 (12)	20:21	19:06 (33)	19:12	2	18:32 (32)	17:09	27	16:20 (31)	16:35
7	05:34		12:30 (34)	06:15	08:34 (35)	07:04	08:08 (35)	07:53			07:47		15:53 (31)	08:35
	22:03	175	15:25 (34)	21:24	20:41 (12)	20:19	19:06 (33)	19:10			17:07	27	16:20 (31)	16:35
8	05:35		12:29 (34)	06:16	08:29 (35)	07:06	08:08 (35)	07:55		18:07 (23)	07:49		15:53 (31)	08:36
	22:02	175	15:24 (34)	21:22	20:39 (12)	20:17	19:05 (33)	19:08	8	18:15 (23)	17:06	27	16:20 (31)	16:35
9	05:36		12:30 (34)	06:18	08:26 (35)	07:07	08:10 (35)	07:56		18:05 (23)	07:50		15:53 (31)	08:37
	22:01	174	15:24 (34)	21:20	20:37 (12)	20:14	19:05 (33)	19:05	13	18:18 (23)	17:04	26	16:19 (31)	16:34
10	05:37		12:30 (34)	06:19	08:24 (35)	07:09	08:10 (35)	07:58		18:03 (23)	07:52		15:53 (31)	08:38
	22:01	175	15:25 (34)	21:18	20:36 (12)	20:12	19:03 (33)	19:03	16	18:19 (23)	17:03	24	16:17 (31)	16:34
11	05:38		12:30 (34)	06:21	08:22 (35)	07:11	08:11 (35)	08:00		18:01 (23)	07:54		15:54 (31)	08:39
	22:00	175	15:25 (34)	21:16	20:34 (12)	20:10	19:03 (33)	19:01	18	18:19 (23)	17:01	21	16:15 (31)	16:34
12	05:39		12:30 (34)	06:23	08:21 (35)	07:12	08:12 (35)	08:01		18:00 (23)	07:56		15:54 (31)	08:40
	21:59	175	15:25 (34)	21:14	20:33 (12)	20:07	19:01 (33)	18:59	17	18:17 (23)	16:59	19	16:13 (31)	16:34
13	05:40		12:31 (34)	06:24	08:19 (35)	07:14	08:14 (35)	08:03		18:00 (23)	07:57		15:55 (31)	08:41
	21:58	174	15:25 (34)	21:12	20:30 (12)	20:05	19:01 (33)	18:57	15	18:15 (23)	16:58	17	16:12 (31)	16:34
14	05:41		12:31 (34)	06:26	08:18 (35)	07:15	08:16 (35)	08:05		18:00 (23)	07:59		15:56 (31)	08:42
	21:57	174	15:25 (34)	21:10	20:29 (12)	20:03	19:00 (33)	18:54	13	18:13 (23)	16:57	14	16:10 (31)	16:34
15	05:42		12:31 (34)	06:27	08:16 (35)	07:17	08:19 (35)	08:06		18:00 (23)	08:01		15:57 (31)	08:43
	21:56	180	20:58 (5)	21:08	20:27 (12)	20:01	18:58 (33)	18:52	11	18:11 (23)	16:55	11	16:08 (31)	16:34
16	05:43		12:31 (34)	06:29	08:16 (35)	07:19	08:23 (35)	08:08		18:00 (23)	08:03		15:58 (31)	08:44
	21:55	183	21:00 (5)	21:06	20:15 (34)	19:58	18:58 (33)	18:50	9	18:09 (23)	16:54	9	16:07 (31)	16:34
17	05:45		12:31 (34)	06:30	08:14 (35)	07:20	13:01 (34)	08:10		17:59 (23)	08:04		16:00 (31)	08:45
	21:54	185	21:01 (5)	21:04	20:15 (34)	19:56	18:55 (33)	18:48	7	18:06 (23)	16:52	5	16:05 (31)	16:34
18	05:46		12:31 (34)	06:32	08:14 (35)	07:22	13:03 (34)	08:12		18:00 (23)	08:06		16:01 (31)	08:46
	21:53	187	21:02 (5)	21:02	20:15 (34)	19:54	18:54 (33)	18:46	3	18:03 (23)	16:51	3	16:04 (31)	16:35
19	05:47		12:32 (34)	06:34	08:13 (35)	07:23	13:05 (34)	08:13			08:08			08:46
	21:52	189	21:04 (5)	21:00	20:15 (34)	19:51	18:52 (33)	18:44			16:50			16:35
20	05:48		12:32 (34)	06:35	08:11 (35)	07:25	13:07 (34)	08:15			08:09			08:47
	21:51	190	21:04 (5)	20:58	20:15 (34)	19:49	18:50 (33)	18:42			16:49			16:35
21	05:50		12:32 (34)	06:37	08:11 (35)	07:27	13:10 (34)	08:17			08:11			08:47
	21:50	191	21:04 (5)	20:56	20:15 (34)	19:47	18:50 (32)	18:40			16:47			16:36
22	05:51		12:32 (34)	06:38	08:10 (35)	07:28	13:12 (34)	08:19			08:13			08:48
	21:48	197	21:03 (5)	20:54	20:15 (34)	19:44	18:50 (32)	18:38			16:46			16:36
23	05:52		12:32 (34)	06:40	08:10 (35)	07:30	13:16 (34)	08:20			08:14			08:48
	21:47	199	21:01 (5)	20:52	20:15 (34)	19:42	18:51 (32)	18:35			16:45			16:37
24	05:54		12:33 (34)	06:42	08:09 (35)	07:32	13:18 (34)	08:22			08:16			08:49
	21:46	202	21:01 (5)	20:50	20:15 (34)	19:40	18:50 (32)	18:33			16:44			16:37
25	05:55		12:33 (34)	06:43	08:09 (35)	07:33	13:23 (34)	07:24			08:18			08:49
	21:44	204	20:59 (5)	20:48	20:15 (34)	19:37	18:51 (32)	17:31			16:43			16:38
26	05:57		12:32 (34)	06:45	08:08 (35)	07:35	13:29 (34)	07:26			08:19			08:50
	21:43	204	20:58 (5)	20:46	20:15 (34)	19:35	18:51 (32)	17:29			16:42			16:38
27	05:58		12:32 (34)	06:47	08:08 (35)	07:36	13:42 (34)	07:27			08:21			08:50
	21:42	204	20:56 (5)	20:43	20:15 (34)	19:33	18:50 (32)	17:27			16:41			16:39
28	06:00		12:33 (34)	06:48	08:07 (35)	07:38	18:21 (32)	07:29		16:05 (31)	08:22			08:50
	21:40	205	20:56 (5)	20:41	20:15 (34)	19:30	18:50 (32)	17:26	4	16:09 (31)	16:40			16:40
29	06:01		12:33 (34)	06:50	08:07 (35)	07:40	18:21 (32)	07:31		16:00 (31)	08:24			08:50
	21:39	204	20:54 (5)	20:39	20:15 (34)	19:28	18:48 (32)	17:24	13	16:13 (31)	16:40			16:41
30	06:02		12:33 (34)	06:51	08:06 (35)	07:41	18:21 (32)	07:33		15:58 (31)	08:25			08:50
	21:37	203	20:52 (5)	20:37	20:15 (34)	19:26	18:45 (32)	17:22	17	16:15 (31)	16:39			16:42
31	06:04		12:34 (34)	06:53	08:07 (35)			07:34			15:57 (31)			08:50
	21:35	202	20:52 (5)	20:35	20:15 (34)	19:07 (33)		17:20	19	16:16 (31)				16:43
Potential sun hours	501		453		381		332		267		245			
Total, worst case	5775			6937	4596		262		354					
Sun reduction	0,40		0,42		0,36		0,31		0,22					
Oper. time red.	0,99		0,99		0,99		0,99		0,99					
Wind dir. red.	0,68		0,66		0,66		0,65		0,69					
Total reduction	0,27		0,28		0,23		0,20		0,15					
Total, real	1545		1917		1070		51		53					

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief: VKA overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (26)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	06:17 21:06	05:32 21:52
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	06:15 21:08	05:31 21:53
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	06:13 21:10	05:31 21:54
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	06:11 21:11	05:30 21:55
5	08:50 16:49	08:18 17:39	07:23 18:30	07:12 20:23	06:10 21:13	05:29 21:56
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	06:08 21:15	05:29 21:57
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	06:06 21:16	05:28 21:58
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	06:04 21:18	05:28 21:59
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	06:03 21:19	05:27 21:59
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	06:01 21:21	05:27 22:00
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	05:59 21:23	05:26 22:01
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	05:58 21:24	05:26 22:02
13	08:46 16:59	08:04 17:54	07:05 18:44	06:54 20:36	05:56 21:26	05:26 22:02
14	08:45 17:01	08:02 17:55	07:03 18:45	06:52 20:38	05:54 21:27	05:25 22:03
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	05:53 21:29	05:25 22:03
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	05:51 21:30	05:25 22:04
17	08:43 17:06	07:56 18:01	06:56 18:51	06:46 20:43	05:50 21:32	05:25 22:04
18	08:42 17:07	07:54 18:03	06:53 18:52	06:44 20:45	05:48 21:33	05:25 22:05
19	08:41 17:09	07:52 18:05	06:51 18:54	06:41 20:46	05:47 21:35	05:25 22:05
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	05:46 21:36	05:25 22:05
21	08:39 17:12	07:48 18:08	06:47 18:57	06:37 20:50	05:44 21:38	05:25 22:06
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51	05:43 21:39	05:26 22:06
23	08:36 17:15	07:44 18:12	06:42 19:01	06:33 20:53	05:42 21:40	05:26 22:06
24	08:35 17:17	07:42 18:14	06:40 19:02	06:31 20:55	05:40 21:42	05:26 22:06
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56	05:39 21:43	05:26 22:06
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	05:38 21:44	05:27 22:06
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	05:37 21:46	05:27 22:06
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	05:36 21:47	05:28 22:06
29	08:29 17:26		06:28 20:11	06:21 21:03	05:35 21:48	05:28 22:06
30	08:27 17:28		06:26 20:13	06:19 21:05	05:34 21:49	05:29 22:06
31	08:26 17:30		06:24 20:14		05:33 21:51	06:22 (2) 06:30 (2)
Potential sun hours	260	278	367	416	484	497
Total, worst case				449	8	902
Sun reduction				0,38	0,43	0,38
Oper. time red.				0,99	0,99	0,99
Wind dir. red.				0,62	0,68	0,68
Total reduction				0,23	0,29	0,26
Total, real				105	2	233

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)

Project:

Alternatief: VKA overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

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M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Witteveen+Bos

SHADOW - Calendar

Shadow receptor: E - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (26)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	July	August	September	October	November	December
1	05:29 22:06 31	06:15 (3) 06:46 (2) 21:34	06:06 21:34 24	06:55 20:33 07:34 (4)	07:43 19:24 17:18	08:27 16:38 17:18
2	05:30 22:05 31	06:16 (3) 06:47 (2) 21:32	06:07 21:32 22	06:56 20:30 07:35 (4)	07:45 19:21 17:16	08:28 16:38 17:16
3	05:31 22:05 30	06:17 (3) 06:47 (2) 21:31	06:09 21:31 19	06:58 20:28 07:37 (4)	07:46 19:19 17:14	08:30 16:37 17:14
4	05:32 22:04 29	06:17 (3) 06:46 (2) 21:29	06:10 21:29 15	07:00 20:26 07:38 (4)	07:48 19:17 17:13	08:31 16:36 17:13
5	05:32 22:04 28	06:18 (3) 06:46 (2) 21:27	06:12 21:27 12	07:01 20:24 07:40 (4)	07:50 19:15 17:11	08:32 16:36 17:11
6	05:33 22:03 27	06:19 (3) 06:46 (2) 21:26	06:13 21:26 7	07:03 20:21 07:41 (4)	07:51 19:12 17:09	08:34 16:35 17:09
7	05:34 22:03 24	06:20 (3) 06:45 (2) 21:24	06:15 21:24 20:19	07:04 20:19 19:10	07:53 19:08 17:08	08:35 16:35 17:08
8	05:35 22:02 21	06:23 (2) 06:44 (2) 21:22	06:16 21:22 20:17	07:06 20:17 19:08	07:55 19:06 17:06	08:36 16:35 17:06
9	05:36 22:02 19	06:24 (2) 06:43 (2) 21:20	06:18 21:20 20:14	07:08 20:14 19:06	07:56 19:03 17:04	08:37 16:34 17:04
10	05:37 22:01 17	06:25 (2) 06:42 (2) 21:18	06:19 21:18 20:12	07:09 20:12 19:03	07:58 19:03 17:03	08:38 16:34 17:03
11	05:38 22:00 14	06:27 (2) 06:41 (2) 21:16	06:21 21:16 20:10	07:11 20:10 19:01	08:00 19:01 17:01	08:39 16:34 17:01
12	05:39 21:59 10	06:29 (2) 06:39 (2) 21:15	06:23 21:15 20:08	07:12 20:08 18:59	08:02 18:59 17:00	08:40 16:34 17:00
13	05:40 21:58 2	06:33 (2) 06:35 (2) 21:13	06:24 21:13 20:05	07:14 20:05 18:57	08:03 18:57 16:58	08:41 16:34 16:58
14	05:41 21:58 15	06:26 21:11 06:27	07:16 20:03 07:17	08:05 18:55 08:07	07:59 16:57 08:01	08:42 16:34 08:43
15	05:42 21:57 16	06:27 21:09 06:29	07:17 20:01 07:19	08:07 18:52 08:08	16:57 16:55 08:03	08:43 16:34 08:44
16	05:44 21:56 17	06:29 21:07 06:31	07:19 19:58 07:20	08:08 18:50 08:10	08:03 16:54 08:05	08:44 16:34 08:45
17	05:45 21:54 18	06:31 21:05 06:32	07:20 19:56 07:22	08:10 18:48 08:12	08:05 16:52 08:06	08:45 16:34 08:46
18	05:46 21:53 19	06:32 21:03 06:34	07:22 19:54 07:24	08:12 18:46 08:13	08:06 16:51 08:08	08:46 16:35 08:46
19	05:47 21:52 20	06:33 21:01 06:35	07:24 19:51 07:25	08:13 18:44 08:15	08:08 16:50 08:10	08:46 16:35 08:47
20	05:49 21:51 21	06:34 20:59 06:37	07:25 19:49 07:27	08:15 18:42 08:17	08:10 16:49 08:11	08:47 16:35 08:48
21	05:50 21:50 22	06:35 20:56 06:39	07:27 19:47 07:28	08:17 18:40 08:19	08:11 16:48 08:13	08:48 16:36 08:48
22	05:51 21:49 23	06:40 20:54 06:40	07:28 19:44 07:30	08:19 18:38 08:20	08:13 16:46 08:15	08:48 16:36 08:49
23	05:53 21:47 24	06:42 20:52 06:42	07:30 19:42 07:32	08:20 18:36 08:22	08:15 16:45 08:16	08:49 16:37 08:49
24	05:54 21:46 25	06:43 20:50 06:43	07:32 19:40 07:33	08:22 18:34 08:24	08:16 16:44 08:18	08:49 16:37 08:50
25	05:55 21:45 26	06:44 20:48 06:45	07:33 19:37 07:35	08:24 18:32 08:26	08:18 16:43 08:19	08:50 16:38 08:50
26	05:57 21:43 27	06:45 20:46 06:47	07:35 19:35 07:37	08:26 18:30 08:28	08:19 16:42 08:21	08:50 16:39 08:50
27	05:58 21:42 28	06:46 20:44 06:48	07:37 19:33 07:38	08:28 18:28 08:29	08:21 16:41 08:22	08:50 16:39 08:50
28	06:00 21:40 29	06:48 20:41 06:50	07:38 19:31 07:40	08:29 18:26 08:31	08:22 16:41 08:24	08:50 16:40 08:50
29	06:01 21:39 30	06:50 20:39 06:51	07:40 19:28 07:41	08:31 18:24 08:33	08:24 16:40 08:25	08:50 16:41 08:51
30	06:03 21:37 31	06:51 20:37 06:53	07:41 19:26 07:32 (4)	08:33 18:22 17:35	08:25 16:39 17:20	08:51 16:42 16:43
Potential sun hours	501	453	381	332	267	245
Total, worst case	283	359	99			
Sun reduction	0,40	0,42	0,36			
Oper. time red.	0,99	0,99	0,99			
Wind dir. red.	0,68	0,62	0,62			
Total reduction	0,27	0,26	0,22			
Total, real	76	92	22			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Last time (hh:mm) with flicker	(WTG causing flicker last time)

Project:

Alternatief: VKA overnachtingsplaatsen

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Van Twickelostraat 2

NL-7411 SC DEVENTER

+31 570 69 76 76

M. Andel / M.Andel@witteveenbos.nl

Calculated:

21-11-2013 11:42/2.7.490

Bos
Witteveen+

SHADOW - Calendar

Shadow receptor: F - Shadow Receptor: 0,1 × 0,1 Azimuth: 0,0° Slope: 0,0° (27)

Assumptions for shadow calculations

Maximum distance for influence 2.000 m
 Minimum sun height over horizon for influence 5 °
 Day step for calculation 1 days
 Time step for calculation 1 minutes

Sunshine probability S (Average daily sunshine hours) []

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1,55	2,68	3,57	5,32	6,69	6,33	6,41	6,17	4,56	3,27	1,96	1,29

Operational time

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW	Sum
603	545	672	606	441	476	764	1.490	1.162	803	529	550	8.641

Idle start wind speed: Cut in wind speed from power curve

	January	February	March	April	May	June	July	August	September	October	November	December		
1	08:51 16:44	08:24 17:31	07:31 18:23	07:21 20:16	08:01 (4) 08:16 (4)	06:17 21:06	05:32 21:52	05:29 22:05	06:06 21:34	06:55 20:33	07:46 (4) 08:23 (4)	07:43 19:24	07:36 17:18	08:27 16:38
2	08:51 16:45	08:23 17:33	07:29 18:24	07:19 20:18	07:57 (4) 08:18 (4)	06:15 21:08	05:31 21:53	05:30 22:05	06:07 21:32	06:56 20:30	07:45 (4) 08:22 (4)	07:45 19:21	07:38 17:16	08:28 16:38
3	08:50 16:46	08:21 17:35	07:27 18:26	07:17 20:19	07:55 (4) 08:20 (4)	06:13 21:10	05:31 21:54	05:31 22:05	06:09 21:31	06:58 20:28	07:46 (4) 08:22 (4)	07:46 19:19	07:40 17:14	08:30 16:37
4	08:50 16:47	08:20 17:37	07:25 18:28	07:14 20:21	07:53 (4) 08:21 (4)	06:11 21:11	05:30 21:55	05:32 22:04	06:10 21:29	07:00 20:26	07:45 (4) 08:21 (4)	07:48 19:17	07:42 17:13	08:31 16:36
5	08:50 16:48	08:18 17:39	07:23 18:30	07:12 20:23	07:52 (4) 08:23 (4)	06:10 21:13	05:29 21:56	05:32 22:04	06:12 21:27	07:01 20:24	07:46 (4) 08:20 (4)	07:50 19:15	07:43 17:11	08:32 16:36
6	08:50 16:50	08:16 17:41	07:20 18:31	07:10 20:24	07:50 (4) 08:23 (4)	06:08 21:15	05:29 21:57	05:33 22:03	06:13 21:26	07:03 20:21	07:46 (4) 08:19 (4)	07:51 19:12	07:45 17:09	08:34 16:35
7	08:49 16:51	08:15 17:42	07:18 18:33	07:08 20:26	07:49 (4) 08:23 (4)	06:06 21:16	05:28 21:58	05:34 22:03	06:15 21:24	07:04 20:19	07:47 (4) 08:18 (4)	07:53 19:10	07:47 17:08	08:35 16:35
8	08:49 16:52	08:13 17:44	07:16 18:35	07:05 20:28	07:48 (4) 08:24 (4)	06:04 21:18	05:28 21:59	05:35 22:02	06:16 21:22	07:06 20:17	07:47 (4) 08:16 (4)	07:55 19:08	07:49 17:06	08:36 16:35
9	08:48 16:54	08:11 17:46	07:14 18:37	07:03 20:29	07:48 (4) 08:24 (4)	06:03 21:19	05:27 21:59	05:36 22:02	06:18 21:20	07:08 20:14	07:49 (4) 08:14 (4)	07:56 19:06	07:51 17:04	08:37 16:34
10	08:48 16:55	08:09 17:48	07:12 18:38	07:01 20:31	07:47 (4) 08:24 (4)	06:01 21:21	05:27 22:00	05:37 22:01	06:19 21:18	07:09 20:12	07:50 (4) 08:12 (4)	07:58 19:03	07:52 17:03	08:38 16:34
11	08:47 16:56	08:07 17:50	07:09 18:40	06:59 20:33	07:47 (4) 08:24 (4)	05:59 21:23	05:26 22:01	05:38 22:00	06:21 21:16	07:11 20:10	07:53 (4) 08:09 (4)	08:00 19:01	07:54 17:01	08:39 16:34
12	08:47 16:58	08:06 17:52	07:07 18:42	06:57 20:35	07:46 (4) 08:23 (4)	05:58 21:24	05:26 22:02	05:39 21:59	06:23 21:15	07:12 20:08	07:57 (4) 08:05 (4)	08:01 18:59	07:56 17:00	08:40 16:34
13	08:46 16:59	08:04 17:53	07:05 18:44	06:54 20:36	07:45 (4) 08:23 (4)	05:56 21:26	05:26 22:02	05:40 21:58	06:24 21:13	07:14 20:05	08:03 18:57	07:58 16:58	08:41 16:34	
14	08:45 17:01	08:02 17:55	07:02 18:45	06:52 20:38	07:45 (4) 08:23 (4)	05:54 21:27	05:25 22:03	05:41 21:57	06:26 21:11	07:16 20:03	08:05 18:55	07:59 16:57	08:42 16:34	
15	08:44 17:02	08:00 17:57	07:00 18:47	06:50 20:40	07:46 (4) 08:22 (4)	05:53 21:29	05:25 22:03	05:42 21:57	06:27 21:09	07:17 20:01	08:07 18:52	08:01 16:55	08:43 16:34	
16	08:44 17:04	07:58 17:59	06:58 18:49	06:48 20:41	07:46 (4) 08:22 (4)	05:51 21:30	05:25 22:04	05:44 21:56	06:29 21:07	07:19 19:58	08:08 18:50	08:03 16:54	08:44 16:34	
17	08:43 17:05	07:56 18:01	06:56 18:51	06:46 20:43	07:46 (4) 08:21 (4)	05:50 21:32	05:25 22:04	05:45 21:54	06:31 21:05	07:20 19:56	08:10 18:48	08:05 16:52	08:45 16:34	
18	08:42 17:07	07:54 18:03	06:53 18:52	06:43 20:45	07:46 (4) 08:20 (4)	05:48 21:33	05:25 22:05	05:46 21:53	06:32 21:03	07:22 08:14 (4)	08:06 19:54	08:12 18:46	08:46 16:51	
19	08:41 17:09	07:52 18:04	06:51 18:54	06:41 20:46	07:47 (4) 08:19 (4)	05:47 21:35	05:25 22:05	05:47 21:52	06:34 21:01	07:24 08:16 (4)	08:13 19:51	08:08 18:44	08:46 16:50	
20	08:40 17:10	07:50 18:06	06:49 18:56	06:39 20:48	07:48 (4) 08:18 (4)	05:46 21:36	05:25 22:05	05:49 21:51	06:35 20:58	07:25 08:19 (4)	07:25 19:49	08:15 18:42	08:10 16:49	
21	08:40 17:12	07:50 18:08	06:49 18:57	06:39 20:50	07:49 (4) 08:16 (4)	05:44 21:38	05:25 22:06	05:50 21:50	06:37 20:56	07:27 08:20 (4)	07:27 19:47	08:17 18:40	08:11 16:47	
22	08:38 17:14	07:46 18:10	06:44 18:59	06:35 20:51	07:50 (4) 08:15 (4)	05:43 21:39	05:26 22:06	05:39 21:49	06:39 20:54	07:28 08:21 (4)	07:28 19:44	08:19 18:38	08:13 16:46	
23	08:36 17:15	07:44 18:12	06:42 19:01	06:33 20:53	07:51 (4) 08:13 (4)	05:42 21:40	05:26 22:06	05:53 21:47	06:40 20:52	07:30 08:22 (4)	07:30 19:42	08:20 18:36	08:15 16:45	
24	08:35 17:17	07:42 18:14	06:40 19:02	06:31 20:55	07:53 (4) 08:10 (4)	05:40 21:42	05:26 22:06	05:54 21:46	06:42 20:50	07:32 08:23 (4)	07:32 19:40	08:22 18:34	08:16 16:44	
25	08:34 17:19	07:40 18:15	06:37 19:04	06:29 20:56	07:56 (4) 08:06 (4)	05:39 21:43	05:26 22:06	05:55 21:45	06:43 20:48	07:33 08:23 (4)	07:33 19:37	07:24 17:32	08:18 16:43	
26	08:33 17:21	07:38 18:17	06:35 19:06	06:27 20:58	05:38 21:44	05:38 22:06	05:27 21:43	05:57 21:43	06:45 20:46	07:35 08:24 (4)	07:35 19:35	07:26 17:30	08:19 16:42	
27	08:31 17:22	07:36 18:19	06:33 19:08	06:25 21:00	05:37 21:46	05:37 22:06	05:27 21:42	05:58 21:42	06:47 20:44	07:37 08:23 (4)	07:37 19:33	07:27 17:28	08:21 16:41	
28	08:30 17:24	07:33 18:21	06:30 19:09	06:23 21:01	05:36 21:47	05:36 22:06	05:28 21:40	06:00 20:41	06:48 20:41	07:38 08:24 (4)	07:38 19:31	07:29 17:26	08:22 16:40	
29	08:29 17:26		07:28 20:11	06:21 21:03	05:35 21:48	05:35 22:06	05:28 21:39	06:01 20:39	06:50 20:39	07:40 08:24 (4)	07:40 19:28	07:31 17:24	08:24 16:40	
30	08:27 17:28		07:26 20:13	06:19 21:05	05:34 21:49	05:34 21:49	05:29 22:06	06:03 21:37	06:51 20:37	07:41 08:24 (4)	07:41 19:26	07:33 17:22	08:25 16:39	
31	08:26 17:30		07:24 20:14	08:06 (4) 08:11 (4)	05:33 21:51	05:33 21:51	06:04 21:36	06:53 20:35	07:41 19:26	06:53 08:23 (4)	07:46 (4)	07:35 17:20	08:51 16:43	
Potential sun hours	260	278	367	416	750	484	497	501	453	381	344	332	267	245
Total, worst case														
Sun reduction					0,30	0,38					0,36			
Oper. time red.					0,99	0,99					0,99			
Wind dir. red.					0,61	0,61					0,61			
Total reduction					0,18	0,23					0,22			
Total, real					1	173			107		74			

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	(WTG causing flicker first time)
	Sun set (hh:mm)	Minutes with flicker	Last time (hh:mm) with flicker
			(WTG causing flicker last time)

BIJLAGE IV GELUID

Afbeelding IV.1. Windprofiel 80 m *

Distributieve windverdeling in procenten

Windsnelheidsklasse	Dag	Avond	Nacht
1	2.4	1.8	1.2
2	5.0	3.9	2.8
3	7.3	6.9	5.8
4	10.1	9.5	7.0
5	11.4	11.0	11.0
6	12.4	12.5	13.7
7	11.8	12.0	14.4
8	10.1	10.7	12.0
9	7.7	9.2	8.9
10	6.2	6.5	7.6
11	5.0	5.3	4.8
12	3.4	3.9	3.8
13	2.2	2.4	2.4
14	1.8	1.8	1.7
15	1.3	0.9	1.2
16	0.9	0.6	0.8
17	0.5	0.4	0.4
18	0.2	0.3	0.2
19	0.1	0.1	0.1
20	0.1	0.0	0.0
21	0.0	0.0	0.0
22	0.1	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
25	0.0	0.0	0.0

* Het windprofiel wordt per turbine gedownload door de software en kan hierdoor licht afwijken.

Afbeelding IV.2. Windprofiel 120 m *

Distributieve windverdeling in procenten

Windsnelheidsklasse	Dag	Avond	Nacht
1	2.0	1.5	1.0
2	4.4	3.3	2.3
3	6.4	5.7	5.0
4	8.7	8.6	6.3
5	10.0	9.9	8.3
6	11.7	11.3	12.5
7	11.1	11.5	13.4
8	10.5	11.0	12.4
9	8.5	9.0	10.2
10	6.5	8.0	8.2
11	5.8	5.8	5.9
12	4.2	4.6	4.4
13	3.0	3.5	3.5
14	2.0	2.3	2.1
15	1.7	1.7	1.6
16	1.2	0.9	1.3
17	0.9	0.6	0.8
18	0.6	0.5	0.5
19	0.3	0.3	0.2
20	0.2	0.1	0.1
21	0.1	0.1	0.0
22	0.0	0.0	0.0
23	0.0	0.0	0.0
24	0.0	0.0	0.0
25	0.1	0.0	0.0

* Het windprofiel wordt per turbine gedownload door de software en kan hierdoor licht afwijken.

2 Guaranteed Sound Power Level 6M126 ²

The sound power level guaranteed by REpower includes a measurement uncertainty of approx. 1 dB(A).

2.1 Sound power level according to IEC for wind speed at hub height

Wind speed v [m/s] ³	Sound Power Level L_{WA} [dB(A)] ⁴
7.0	105.8
8.0	107.2
9.0	108.3
10.0	109.0
11.0	109.0
12.0	109.0
13.0	109.0
14.0	109.0
15.0	109.0
16.0	109.0
17.0	109.0
18.0	109.0
19.0	109.0
20.0	109.0
21.0	109.0
22.0	109.0
23.0	109.0
24.0	109.0
25.0	109.0

² Valid for unrestricted operation only. During sound reduced operation different power and sound levels are effective.

³ Wind speed at hub height

⁴ Sound power level at hub height

SWT-3.0-101 (107 dB), Hub Height 79.5 m Standard Acoustic Emission

Typical Sound Power Levels

The typical sound power level is presented with reference to the code IEC 61400-11:2002 with amendment 1 dated 2006-05 based on a hub height of 79.5 m and a roughness length of 0.05 m as described in the IEC code. The sound power levels (L_{WA}) presented are valid for the corresponding wind speeds referenced to a height of 10 m above ground level.

Wind speed [m/s]	4	5	6	7	8	9	10	11	12	Up to cut-out
Standard setting	95.1	99.8	105.1	107.0	107.0	107.0	107.0	107.0	107.0	107.0
"Setting -1 dB"	95.1	99.8	104.2	106.0	106.0	106.0	106.0	106.0	106.0	106.0
"Setting -2 dB"	95.1	99.8	103.2	105.0	105.0	105.0	105.0	105.0	105.0	105.0
"Setting -3 dB"	95.1	99.4	102.2	104.0	104.0	104.0	104.0	104.0	104.0	104.0
"Setting -4 dB"	95.1	98.6	101.2	103.0	103.0	103.0	103.0	103.0	103.0	103.0
"Setting -5 dB"	95.0	97.7	100.2	102.0	102.0	102.0	102.0	102.0	102.0	102.0
"Setting -6 dB"	95.0	97.5	99.4	101.0	101.0	101.0	101.0	101.0	101.0	101.0

Table 1: Noise emission, L_{WA} [dB(A) re 1 pW]

Typical Octave Band

Typical, not warranted octave band spectra are tabulated below for 8 m/s referenced to 10 m height.

Octave band, centre frequency [Hz]	63	125	250	500	1000	2000	4000	8000
Standard setting	81.8	93.7	100.4	103.7	100.4	92.5	81.6	78.3
"Setting -1 dB"	81.7	93.4	99.4	102.5	99.5	91.7	81.1	77.9
"Setting -2 dB"	81.7	93.1	98.4	101.3	98.6	90.9	80.7	77.5
"Setting -3 dB"	81.9	92.9	97.4	100.2	97.9	90.1	80.4	77.3
"Setting -4 dB"	81.9	92.6	96.3	98.9	96.9	89.3	80.0	76.9
"Setting -5 dB"	81.7	92.1	95.3	97.7	95.9	88.3	79.3	76.3
"Setting -6 dB"	81.8	91.9	94.1	96.5	95.1	87.4	78.9	76.0

Table 2: Typical octave band for 8 m/s, L_{WA} [dB(A) re 1 pW]

Noise Restricted Operation

The lower sound power levels presented for "Setting -1 dB" to "Setting -6 dB" are achieved by controlling the SWT-3.0-101 (107 dB) wind turbine in a noise restricted mode of operation. This noise restricted mode of operation will, depending on the mode, have an impact on the power output of the wind turbine. Please contact Siemens for further information on this option.

SWT-3.0-113, Hub Height 122.50 m

Standard Acoustic Emission

Typical Sound Power Levels

The sound power levels are presented with reference to the code IEC 61400-11 ed. 2.1 (2006-12) based on a hub height of 122.5 m and a roughness length of 0.05 m as described in the IEC code. The sound power levels (L_{WA}) presented are valid for the corresponding wind speeds referenced to a height of 10.0 m above ground level.

Wind speed [m/s]	3	4	5	6	7	8	9	10	11	12	Up to cut-out
Standard setting	91.2	96.1	100.8	104.9	105.5	105.5	105.5	105.5	105.5	105.5	105.5
"Setting -1 dB"	91.2	96.1	100.7	104.3	104.5	104.5	104.5	104.5	104.5	104.5	104.5
"Setting -2 dB"	91.2	96.0	100.5	103.4	103.5	103.5	103.5	103.5	103.5	103.5	103.5
"Setting -3 dB"	91.2	95.8	100.3	102.5	102.5	102.5	102.5	102.5	102.5	102.5	102.5
"Setting -4 dB"	91.2	95.6	99.7	101.4	101.5	101.5	101.5	101.5	101.5	101.5	101.5
"Setting -5 dB"	91.2	95.7	99.3	100.4	100.5	100.5	100.5	100.5	100.5	100.5	100.5

Table 1: Acoustic emission, L_{WA} [dB(A) re 1 pW]

1/1 oct. band, center freq.	63	125	250	500	1000	2000	4000	8000
Standard setting	92.2	94.2	97.2	97.9	99.5	98.6	95.2	86.3
"Setting -1 dB"	92.0	93.8	97.3	96.5	97.7	97.4	94.1	86.1
"Setting -2 dB"	91.7	93.4	95.5	95.5	96.9	96.4	93.0	84.5
"Setting -3 dB"	91.5	93.0	95.5	94.0	95.1	95.2	91.9	84.2
"Setting -4 dB"	91.2	92.6	94.8	92.6	93.5	93.9	90.7	83.4
"Setting -5 dB"	91.0	92.2	94.1	91.1	91.9	92.6	89.4	82.5

Table 2: Typical 1/1 octave band spectrum for 63 Hz to 8 k Hz at 8 m/s

Noise Restricted Operation

The lower sound power levels presented for the settings listed above are achieved by controlling the SWT-3.0-113 wind turbine in a noise restricted mode of operation. This noise restricted mode of operation will, depending on the mode, have an impact on the power output of the wind turbine. Please contact Siemens for further information on this option.

Model: 1. Enkele lijn
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D) Totaal	LE (A) Totaal	LE (N) Totaal
01	Siemens SWT 3.0	68816,00	409067,00	0,00	79,50	103,04	103,26	103,43
02	Siemens SWT 3.0	69196,00	409079,00	0,00	79,50	103,02	103,25	103,41
03	Siemens SWT 3.0	69575,00	409090,00	0,00	79,50	103,02	103,25	103,41
04	Siemens SWT 3.0	69955,00	409102,00	0,00	79,50	102,99	103,21	103,39
05	Siemens SWT 3.0	70335,00	409113,00	0,00	79,50	102,99	103,21	103,39
06	Siemens SWT 3.0	70715,00	409125,00	0,00	79,50	102,95	103,21	103,38
07	Siemens SWT 3.0	71095,00	409137,00	0,00	79,50	102,95	103,21	103,38
08	Siemens SWT 3.0	71475,00	409148,00	0,00	79,50	102,95	103,17	103,36
09	Siemens SWT 3.0	68821,00	408544,00	0,00	79,50	103,04	103,26	103,43
10	Siemens SWT 3.0	69201,00	408555,00	0,00	79,50	103,02	103,25	103,41
11	Siemens SWT 3.0	69581,00	408567,00	0,00	79,50	103,02	103,25	103,41
12	Siemens SWT 3.0	69960,00	408578,00	0,00	79,50	102,99	103,21	103,39
13	Siemens SWT 3.0	70340,00	408590,00	0,00	79,50	102,99	103,21	103,39
14	Siemens SWT 3.0	70720,00	408602,00	0,00	79,50	102,95	103,21	103,38
15	Siemens SWT 3.0	71100,00	408613,00	0,00	79,50	102,95	103,21	103,38
16	Siemens SWT 3.0	71480,00	408625,00	0,00	79,50	102,95	103,17	103,36
17	RePower 6	68746,00	410646,00	0,00	117,00	106,49	106,66	106,83
18	RePower 6	69245,00	410624,00	0,00	117,00	106,47	106,66	106,82
19	RePower 6	69689,00	410394,00	0,00	117,00	106,47	106,66	106,82
20	RePower 6	70027,00	410028,00	0,00	117,00	106,45	106,62	106,80
21	RePower 6	70273,00	409590,00	0,00	117,00	106,45	106,62	106,80
22	RePower 6	70432,00	408119,00	0,00	117,00	106,40	106,58	106,79
23	RePower 6	70775,00	407783,00	0,00	117,00	106,41	106,59	106,76
24	RePower 6	71199,00	407557,00	0,00	117,00	106,41	106,57	106,75
25	RePower 6	71630,00	407346,00	0,00	117,00	106,41	106,57	106,75

Model: 2. Dubbele lijn
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D)	Totaal	LE (A)	Totaal	LE (N)	Totaal
01	Siemens SWT 3.0	69204,00	410744,00	0,00	79,50		103,05		103,27		103,44
02	Siemens SWT 3.0	69454,00	410334,00	0,00	79,50		103,05		103,27		103,44
03	Siemens SWT 3.0	69530,00	410943,00	0,00	79,50		103,05		103,27		103,44
04	Siemens SWT 3.0	69704,00	409924,00	0,00	79,50		103,04		103,27		103,43
05	Siemens SWT 3.0	69778,00	410532,00	0,00	79,50		103,03		103,26		103,43
06	Siemens SWT 3.0	69865,00	409526,00	0,00	79,50		103,02		103,24		103,41
07	Siemens SWT 3.0	70028,00	410122,00	0,00	79,50		103,02		103,24		103,41
08	Siemens SWT 3.0	70278,00	409674,00	0,00	79,50		103,02		103,24		103,41
09	Siemens SWT 3.0	68816,00	409067,00	0,00	79,50		103,04		103,26		103,43
10	Siemens SWT 3.0	69196,00	409079,00	0,00	79,50		103,02		103,25		103,41
11	Siemens SWT 3.0	69575,00	409090,00	0,00	79,50		103,02		103,25		103,41
12	Siemens SWT 3.0	69955,00	409102,00	0,00	79,50		102,99		103,21		103,39
13	Siemens SWT 3.0	70335,00	409113,00	0,00	79,50		102,99		103,21		103,39
14	Siemens SWT 3.0	70715,00	409125,00	0,00	79,50		102,95		103,21		103,38
15	Siemens SWT 3.0	71095,00	409137,00	0,00	79,50		102,95		103,21		103,38
16	Siemens SWT 3.0	71475,00	409148,00	0,00	79,50		102,95		103,17		103,36
17	Siemens SWT 3.0	68821,00	408544,00	0,00	79,50		103,04		103,26		103,43
18	Siemens SWT 3.0	69201,00	408555,00	0,00	79,50		103,02		103,25		103,41
19	Siemens SWT 3.0	69581,00	408567,00	0,00	79,50		103,02		103,25		103,41
20	Siemens SWT 3.0	69960,00	408578,00	0,00	79,50		102,99		103,21		103,39
21	Siemens SWT 3.0	70340,00	408590,00	0,00	79,50		102,99		103,21		103,39
22	Siemens SWT 3.0	70720,00	408602,00	0,00	79,50		102,95		103,21		103,38
23	Siemens SWT 3.0	71100,00	408613,00	0,00	79,50		102,95		103,21		103,38
24	Siemens SWT 3.0	71480,00	408625,00	0,00	79,50		102,95		103,17		103,36
25	Siemens SWT 3.0	70017,00	408225,00	0,00	79,50		102,99		103,21		103,39
26	Siemens SWT 3.0	70038,00	407871,00	0,00	79,50		102,95		103,21		103,38
27	Siemens SWT 3.0	70342,00	407624,00	0,00	79,50		102,95		103,21		103,38
28	Siemens SWT 3.0	70389,00	408213,00	0,00	79,50		102,99		103,21		103,39
29	Siemens SWT 3.0	70609,00	407904,00	0,00	79,50		102,94		103,18		103,36
30	Siemens SWT 3.0	70738,00	407369,00	0,00	79,50		102,94		103,18		103,36
31	Siemens SWT 3.0	70929,00	407698,00	0,00	79,50		102,94		103,18		103,36
32	Siemens SWT 3.0	71099,00	407181,00	0,00	79,50		102,94		103,18		103,36
33	Siemens SWT 3.0	71266,00	407523,00	0,00	79,50		102,94		103,17		103,34
34	Siemens SWT 3.0	71454,00	407019,00	0,00	79,50		102,94		103,17		103,34
35	Siemens SWT 3.0	71612,00	407365,00	0,00	79,50		102,94		103,17		103,34

Model: 3. Dubbele wolk
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D)	Totaal	LE (A)	Totaal	LE (N)	Totaal
01	Siemens SWT 3.0	68575,00	408913,00	0,00	79,50		103,03		103,26		103,42
02	Siemens SWT 3.0	68595,00	408494,00	0,00	79,50		103,03		103,26		103,42
03	Siemens SWT 3.0	68847,00	408287,00	0,00	79,50		103,03		103,26		103,42
04	Siemens SWT 3.0	68976,00	409097,00	0,00	79,50		103,03		103,26		103,42
05	Siemens SWT 3.0	69081,00	408540,00	0,00	79,50		103,01		103,24		103,40
06	Siemens SWT 3.0	69234,00	408191,00	0,00	79,50		103,01		103,24		103,40
07	Siemens SWT 3.0	69336,00	409107,00	0,00	79,50		103,01		103,24		103,40
08	Siemens SWT 3.0	69477,00	408591,00	0,00	79,50		103,01		103,24		103,40
09	Siemens SWT 3.0	69637,00	408255,00	0,00	79,50		103,01		103,24		103,40
10	Siemens SWT 3.0	69691,00	409119,00	0,00	79,50		103,01		103,24		103,40
11	Siemens SWT 3.0	69872,00	408645,00	0,00	79,50		102,98		103,21		103,39
12	Siemens SWT 3.0	69959,00	407914,00	0,00	79,50		102,94		103,20		103,37
13	Siemens SWT 3.0	70046,00	409306,00	0,00	79,50		103,01		103,23		103,40
14	Siemens SWT 3.0	70054,00	408332,00	0,00	79,50		102,98		103,21		103,39
15	Siemens SWT 3.0	70192,00	409818,00	0,00	79,50		103,01		103,23		103,40
16	Siemens SWT 3.0	70286,00	409001,00	0,00	79,50		102,98		103,21		103,39
17	Siemens SWT 3.0	70313,00	407676,00	0,00	79,50		102,94		103,20		103,37
18	Siemens SWT 3.0	70325,00	408623,00	0,00	79,50		102,98		103,21		103,39
19	Siemens SWT 3.0	70382,00	409453,00	0,00	79,50		103,01		103,23		103,40
20	Siemens SWT 3.0	70431,00	408118,00	0,00	79,50		102,95		103,20		103,38
21	Siemens SWT 3.0	70636,00	409164,00	0,00	79,50		102,95		103,20		103,38
22	Siemens SWT 3.0	70660,00	407432,00	0,00	79,50		102,93		103,17		103,35
23	Siemens SWT 3.0	70756,00	407802,00	0,00	79,50		102,93		103,17		103,35
24	Siemens SWT 3.0	70757,00	408637,00	0,00	79,50		102,95		103,20		103,38
25	Siemens SWT 3.0	70789,00	409490,00	0,00	79,50		102,98		103,21		103,39
26	Siemens SWT 3.0	71046,00	407251,00	0,00	79,50		102,93		103,17		103,35
27	Siemens SWT 3.0	71063,00	409170,00	0,00	79,50		102,98		103,21		103,39
28	Siemens SWT 3.0	71129,00	407642,00	0,00	79,50		102,93		103,17		103,33
29	Siemens SWT 3.0	71193,00	408611,00	0,00	79,50		102,94		103,17		103,35
30	Siemens SWT 3.0	71416,00	409103,00	0,00	79,50		102,94		103,17		103,35
31	Siemens SWT 3.0	71466,00	407444,00	0,00	79,50		102,93		103,17		103,33
32	Siemens SWT 3.0	71626,00	408658,00	0,00	79,50		102,94		103,17		103,35
33	Siemens SWT 3.0	68790,00	410642,00	0,00	79,50		103,08		103,30		103,47
34	Siemens SWT 3.0	69150,00	410760,00	0,00	79,50		103,05		103,27		103,44
35	Siemens SWT 3.0	69345,00	410409,00	0,00	79,50		103,05		103,27		103,44
36	Siemens SWT 3.0	69520,00	410863,00	0,00	79,50		103,05		103,27		103,44

Model: 3. Dubbele wolk
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D) Totaal	LE (A) Totaal	LE (N) Totaal
37	Siemens SWT 3.0	69775,00	411177,00	0,00	79,50	103,05	103,27	103,44
38	Siemens SWT 3.0	69818,00	410414,00	0,00	79,50	103,02	103,25	103,42
39	Siemens SWT 3.0	69883,00	410799,00	0,00	79,50	103,02	103,25	103,42

Model: 4. Grote wolk
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D)	Totaal	LE (A)	Totaal	LE (N)	Totaal
01	Siemens SWT 3.0	68575,68	408912,03	0,00	122,50		102,25		102,49		102,70
02	Siemens SWT 3.0	68596,77	408492,17	0,00	122,50		102,25		102,49		102,70
03	Siemens SWT 3.0	68847,92	408285,12	0,00	122,50		102,25		102,49		102,70
04	Siemens SWT 3.0	68978,28	409096,08	0,00	122,50		102,25		102,49		102,70
05	Siemens SWT 3.0	69081,81	408538,18	0,00	122,50		102,23		102,45		102,68
06	Siemens SWT 3.0	69235,18	408189,26	0,00	122,50		102,23		102,45		102,68
07	Siemens SWT 3.0	69336,79	409105,67	0,00	122,50		102,23		102,45		102,68
08	Siemens SWT 3.0	69480,58	408589,95	0,00	122,50		102,23		102,45		102,68
09	Siemens SWT 3.0	69639,71	408252,53	0,00	122,50		102,23		102,45		102,68
10	Siemens SWT 3.0	69691,47	409117,17	0,00	122,50		102,23		102,45		102,68
11	Siemens SWT 3.0	69873,60	408643,63	0,00	122,50		102,21		102,44		102,68
12	Siemens SWT 3.0	69961,79	407913,19	0,00	122,50		102,20		102,42		102,66
13	Siemens SWT 3.0	70045,97	409305,48	0,00	122,50		102,23		102,45		102,68
14	Siemens SWT 3.0	70053,68	408329,96	0,00	122,50		102,21		102,44		102,68
15	Siemens SWT 3.0	70193,01	409816,37	0,00	122,50		102,23		102,45		102,68
16	Siemens SWT 3.0	70286,56	409000,49	0,00	122,50		102,21		102,44		102,68
17	Siemens SWT 3.0	70314,55	407675,46	0,00	122,50		102,20		102,42		102,66
18	Siemens SWT 3.0	70325,18	408621,36	0,00	122,50		102,21		102,44		102,68
19	Siemens SWT 3.0	70383,77	409452,51	0,00	122,50		102,23		102,45		102,68
20	Siemens SWT 3.0	70433,42	408118,32	0,00	122,50		102,20		102,41		102,66
21	Siemens SWT 3.0	70636,51	409163,32	0,00	122,50		102,20		102,41		102,66
22	Siemens SWT 3.0	70661,56	407430,06	0,00	122,50		102,18		102,41		102,64
23	Siemens SWT 3.0	70757,42	407800,07	0,00	122,50		102,18		102,41		102,64
24	Siemens SWT 3.0	70757,29	408636,99	0,00	122,50		102,20		102,41		102,66
25	Siemens SWT 3.0	70789,61	409488,96	0,00	122,50		102,22		102,44		102,67
26	Siemens SWT 3.0	71048,83	407249,85	0,00	122,50		102,18		102,41		102,64
27	Siemens SWT 3.0	71064,23	409169,39	0,00	122,50		102,22		102,44		102,67
28	Siemens SWT 3.0	71131,27	407640,95	0,00	122,50		102,18		102,39		102,63
29	Siemens SWT 3.0	71193,68	408609,98	0,00	122,50		102,18		102,41		102,64
30	Siemens SWT 3.0	71415,42	409101,80	0,00	122,50		102,18		102,41		102,64
31	Siemens SWT 3.0	71466,77	407441,56	0,00	122,50		102,18		102,39		102,63
32	Siemens SWT 3.0	71627,22	408656,89	0,00	122,50		102,18		102,41		102,64
33	Siemens SWT 3.0	68790,61	410642,15	0,00	122,50		102,28		102,51		102,73
34	Siemens SWT 3.0	69150,29	410758,60	0,00	122,50		102,27		102,48		102,71
35	Siemens SWT 3.0	69345,23	410408,40	0,00	122,50		102,27		102,48		102,71
36	Siemens SWT 3.0	69520,33	410862,10	0,00	122,50		102,27		102,48		102,71

Model: 4. Grote wolk
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D) Totaal	LE (A) Totaal	LE (N) Totaal
37	Siemens SWT 3.0	69775,30	411176,58	0,00	122,50	102,27	102,48	102,71
38	Siemens SWT 3.0	69819,30	410413,53	0,00	122,50	102,26	102,47	102,70
39	Siemens SWT 3.0	69883,68	410798,40	0,00	122,50	102,26	102,47	102,70
40	Siemens SWT 3.0	68573,76	409333,81	0,00	122,50	102,27	102,50	102,72
41	Siemens SWT 3.0	68834,32	409748,31	0,00	122,50	102,27	102,50	102,72
42	Siemens SWT 3.0	69070,61	410109,17	0,00	122,50	102,27	102,50	102,72
43	Siemens SWT 3.0	69171,92	409412,42	0,00	122,50	102,26	102,48	102,69
44	Siemens SWT 3.0	69296,63	409809,95	0,00	122,50	102,26	102,48	102,69
45	Siemens SWT 3.0	69588,15	410055,23	0,00	122,50	102,26	102,48	102,69
46	Siemens SWT 3.0	69730,69	409598,06	0,00	122,50	102,26	102,48	102,69
47	Siemens SWT 3.0	70005,51	410118,16	0,00	122,50	102,23	102,45	102,68
48	Siemens SWT 3.0	70257,22	410526,54	0,00	122,50	102,26	102,47	102,70
49	Siemens SWT 3.0	70491,91	410255,69	0,00	122,50	102,22	102,44	102,67
50	Siemens SWT 3.0	70630,44	409894,81	0,00	122,50	102,22	102,44	102,67

Model: 5. Wolk
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D) Totaal	LE (A) Totaal	LE (N) Totaal
1	Siemens SWT 3.0	68575,01	408913,28	0,00	79,50	103,04	103,26	103,43
2	Siemens SWT 3.0	68595,01	408494,28	0,00	79,50	103,04	103,26	103,43
3	Siemens SWT 3.0	68847,01	408287,28	0,00	79,50	103,04	103,26	103,43
4	Siemens SWT 3.0	68976,01	409097,27	0,00	79,50	103,04	103,26	103,43
5	Siemens SWT 3.0	69081,01	408540,28	0,00	79,50	103,02	103,25	103,41
6	Siemens SWT 3.0	69234,01	408191,28	0,00	79,50	103,02	103,25	103,41
7	Siemens SWT 3.0	69336,01	409107,27	0,00	79,50	103,02	103,25	103,41
8	Siemens SWT 3.0	69477,01	408591,28	0,00	79,50	103,02	103,25	103,41
9	Siemens SWT 3.0	69637,01	408255,28	0,00	79,50	103,02	103,25	103,41
10	Siemens SWT 3.0	69691,01	409119,27	0,00	79,50	103,02	103,25	103,41
11	Siemens SWT 3.0	69872,01	408645,27	0,00	79,50	102,99	103,21	103,39
12	Siemens SWT 3.0	69959,01	407914,28	0,00	79,50	102,95	103,21	103,38
13	Siemens SWT 3.0	70046,01	409306,27	0,00	79,50	103,02	103,24	103,41
14	Siemens SWT 3.0	70054,01	408332,28	0,00	79,50	102,99	103,21	103,39
15	Siemens SWT 3.0	70192,01	409818,26	0,00	79,50	103,02	103,24	103,41
16	Siemens SWT 3.0	70286,01	409001,27	0,00	79,50	102,99	103,21	103,39
17	Siemens SWT 3.0	70313,01	407676,28	0,00	79,50	102,95	103,21	103,38
18	Siemens SWT 3.0	70325,01	408623,27	0,00	79,50	102,99	103,21	103,39
19	Siemens SWT 3.0	70382,01	409453,27	0,00	79,50	103,02	103,24	103,41
20	Siemens SWT 3.0	70431,01	408118,28	0,00	79,50	102,95	103,21	103,38
21	Siemens SWT 3.0	70636,55	409164,47	0,00	79,50	102,95	103,21	103,38
22	Siemens SWT 3.0	70660,01	407432,28	0,00	79,50	102,94	103,18	103,36
23	Siemens SWT 3.0	70756,01	407802,28	0,00	79,50	102,94	103,18	103,36
24	Siemens SWT 3.0	70757,01	408637,27	0,00	79,50	102,95	103,21	103,38
25	Siemens SWT 3.0	70789,01	409490,26	0,00	79,50	102,99	103,22	103,40
26	Siemens SWT 3.0	71046,01	407251,28	0,00	79,50	102,94	103,18	103,36
27	Siemens SWT 3.0	71063,01	409170,27	0,00	79,50	102,99	103,22	103,40
28	Siemens SWT 3.0	71129,01	407642,28	0,00	79,50	102,94	103,17	103,34
29	Siemens SWT 3.0	71193,01	408611,27	0,00	79,50	102,95	103,17	103,36
30	Siemens SWT 3.0	71416,01	409103,27	0,00	79,50	102,95	103,17	103,36
31	Siemens SWT 3.0	71466,01	407444,28	0,00	79,50	102,94	103,17	103,34
32	Siemens SWT 3.0	71626,01	408658,27	0,00	79,50	102,95	103,17	103,36

Model: 6. VKA
Groep: (hoofdgroep)
Lijst van Windturbines, voor rekenmethode Industrielawaai - IL-WT

Naam	Omschr.	X	Y	Maaiveld	Hoogte	LE (D) Totaal	LE (A) Totaal	LE (N) Totaal
01	Siemens SWT 3.0	69224,80	410594,29	0,00	122,50	102,27	102,48	102,71
02	Siemens SWT 3.0	69495,63	410705,53	0,00	122,50	102,27	102,48	102,71
03	Siemens SWT 3.0	69821,41	410948,84	0,00	122,50	102,26	102,47	102,70
04	Siemens SWT 3.0	69768,71	410441,73	0,00	122,50	102,27	102,48	102,71
05	Siemens SWT 3.0	70006,10	409278,40	0,00	122,50	102,23	102,45	102,68
06	Siemens SWT 3.0	70389,01	409415,27	0,00	122,50	102,23	102,45	102,68
07	Siemens SWT 3.0	70940,01	409460,26	0,00	122,50	102,22	102,44	102,67
08	Siemens SWT 3.0	68585,67	408900,77	0,00	122,50	102,25	102,49	102,70
09	Siemens SWT 3.0	68956,38	409080,30	0,00	122,50	102,25	102,49	102,70
10	Siemens SWT 3.0	69324,16	409092,12	0,00	122,50	102,23	102,45	102,68
11	Siemens SWT 3.0	69673,27	409103,10	0,00	122,50	102,23	102,45	102,68
12	Siemens SWT 3.0	70311,82	409013,91	0,00	122,50	102,21	102,44	102,68
13	Siemens SWT 3.0	70714,82	409138,47	0,00	122,50	102,20	102,41	102,66
14	Siemens SWT 3.0	71171,88	409152,92	0,00	122,50	102,18	102,41	102,64
15	Siemens SWT 3.0	71520,09	409062,54	0,00	122,50	102,18	102,41	102,64
16	Siemens SWT 3.0	69793,79	408635,72	0,00	122,50	102,21	102,44	102,68
17	Siemens SWT 3.0	69394,35	408595,09	0,00	122,50	102,23	102,45	102,68
18	Siemens SWT 3.0	68995,41	408540,85	0,00	122,50	102,25	102,49	102,70
19	Siemens SWT 3.0	68596,01	408493,28	0,00	122,50	102,25	102,49	102,70
20	Siemens SWT 3.0	68888,94	408277,10	0,00	122,50	102,25	102,49	102,70
21	Siemens SWT 3.0	69238,96	408192,93	0,00	122,50	102,23	102,45	102,68
22	Siemens SWT 3.0	69676,66	408290,97	0,00	122,50	102,23	102,45	102,68
23	Siemens SWT 3.0	70018,79	408274,41	0,00	122,50	102,21	102,44	102,68
24	Siemens SWT 3.0	69956,61	407909,29	0,00	122,50	102,20	102,42	102,66
25	Siemens SWT 3.0	70324,28	407656,31	0,00	122,50	102,20	102,42	102,66
26	Siemens SWT 3.0	70687,62	407405,60	0,00	122,50	102,18	102,41	102,64
27	Siemens SWT 3.0	71047,01	407250,28	0,00	122,50	102,18	102,41	102,64
28	Siemens SWT 3.0	71431,91	407452,04	0,00	122,50	102,18	102,39	102,63
29	Siemens SWT 3.0	71070,57	407638,33	0,00	122,50	102,18	102,41	102,64
30	Siemens SWT 3.0	70716,87	407821,96	0,00	122,50	102,18	102,41	102,64
31	Siemens SWT 3.0	70425,06	408113,37	0,00	122,50	102,21	102,44	102,68
32	Siemens SWT 3.0	70336,78	408522,60	0,00	122,50	102,21	102,44	102,68
33	Siemens SWT 3.0	70761,24	408640,21	0,00	122,50	102,20	102,41	102,66
34	Siemens SWT 3.0	71200,56	408613,83	0,00	122,50	102,18	102,41	102,64
35	Siemens SWT 3.0	71638,86	408660,30	0,00	122,50	102,18	102,41	102,64

Rapport: Resultatentabel
Model: 1. Enkele lijn
LAeq totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	30,4	30,6	30,7	37,1
02_A	woning Battenoordseweg	5,00	30,0	30,2	30,3	36,7
03_A	woning Blaakweg	5,00	31,2	31,4	31,5	37,9
04_A	woning Oudelandsedijk	5,00	31,8	32,0	32,2	38,6
05_A	woning Noordweg	5,00	30,5	30,7	30,8	37,2
06_A	woning Langeweg	5,00	32,4	32,6	32,8	39,1
07_A	woning Hogeweg	5,00	33,2	33,4	33,6	39,9
08_A	bedrijfswoning restaurant Grevelingen	5,00	45,1	45,3	45,5	51,8
09_A	woning Eendenkooi	5,00	33,2	33,4	33,6	40,0
10_A	woning Eendenkooi	5,00	33,1	33,3	33,4	39,8
11_A	woning Eendenkooi	5,00	32,9	33,1	33,2	39,6
12_A	woning Hogeweg	5,00	32,9	33,1	33,3	39,6
13_A	woning Scharreweg	5,00	33,4	33,5	33,7	40,0
14_A	woning Zuidijk	5,00	31,6	31,9	32,0	38,4
15_A	woning Suisenweg	5,00	31,6	31,9	32,0	38,4
16_A	bedrijfswoning Meerzicht	5,00	38,6	38,8	39,0	45,3
17_A	woning Oude Tonge	5,00	31,1	31,3	31,5	37,8
18_A	woning Oude Tonge	5,00	31,1	31,3	31,5	37,8
19_A	woning Oude Tonge	5,00	31,0	31,2	31,4	37,7
20_A	woning Oude Tonge	5,00	31,1	31,3	31,5	37,8
21_A	woning Oude Tonge	5,00	32,5	32,7	32,9	39,2
31_A	overnachtingsplaatsen	5,00	51,1	51,3	51,4	57,8
32_A	overnachtingsplaatsen	5,00	52,1	52,4	52,5	58,9
33_A	overnachtingsplaatsen	5,00	52,9	53,1	53,3	59,6
34_A	overnachtingsplaatsen	5,00	51,8	52,1	52,3	58,6
35_A	MZI-, oester- en mosselperceel	1,50	41,6	41,8	42,0	48,3
36_A	MZI-, oester- en mosselperceel	1,50	44,6	44,8	45,0	51,3
37_A	MZI-, oester- en mosselperceel	1,50	44,0	44,2	44,4	50,7
38_A	MZI-, oester- en mosselperceel	1,50	44,0	44,2	44,4	50,7
39_A	MZI-, oester- en mosselperceel	1,50	44,7	44,9	45,0	51,4
40_A	MZI-, oester- en mosselperceel	1,50	45,2	45,3	45,5	51,8
41_A	MZI-, oester- en mosselperceel	1,50	44,8	44,9	45,1	51,4
42_A	MZI-, oester- en mosselperceel	1,50	37,7	37,9	38,1	44,4
43_A	MZI-, oester- en mosselperceel	1,50	45,9	46,1	46,3	52,6
44_A	MZI-, oester- en mosselperceel	1,50	50,0	50,3	50,4	56,8
45_A	MZI-, oester- en mosselperceel	1,50	51,5	51,7	51,8	58,2
46_A	MZI-, oester- en mosselperceel	1,50	51,8	52,0	52,2	58,5
47_A	MZI-, oester- en mosselperceel	1,50	50,0	50,2	50,4	56,7
48_A	MZI-, oester- en mosselperceel	1,50	50,6	50,8	50,9	57,3
49_A	MZI-, oester- en mosselperceel	1,50	50,9	51,1	51,3	57,6
50_A	MZI-, oester- en mosselperceel	1,50	51,6	51,8	52,0	58,3
51_A	MZI-, oester- en mosselperceel	1,50	48,4	48,6	48,7	55,1
52_A	MZI-, oester- en mosselperceel	1,50	45,3	45,5	45,6	52,0
53_A	MZI-, oester- en mosselperceel	1,50	42,4	42,5	42,7	49,1
54_A	MZI-, oester- en mosselperceel	1,50	39,2	39,4	39,6	45,9
55_A	MZI-, oester- en mosselperceel	1,50	35,9	36,1	36,3	42,6
56_A	terras restaurant Grevelingen	1,00	46,6	46,7	46,9	53,2
57_A	werkhaven	1,00	50,2	50,4	50,6	56,9

Alle getoonde dB-waarden zijn A-gewogen

Rapport: Resultatentabel
Model: 2. Dubbele lijn
L_{Aeq} totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	30,4	30,6	30,8	37,1
02_A	woning Battenoordseweg	5,00	29,4	29,6	29,8	36,1
03_A	woning Blaakweg	5,00	30,7	30,9	31,1	37,4
04_A	woning Oudelandsedijk	5,00	31,5	31,7	31,9	38,2
05_A	woning Noordweg	5,00	30,8	31,0	31,2	37,5
06_A	woning Langeweg	5,00	33,3	33,5	33,7	40,1
07_A	woning Hogeweg	5,00	34,2	34,4	34,6	40,9
08_A	bedrijfswoning restaurant Grevelingen	5,00	42,8	43,0	43,2	49,5
09_A	woning Eendenkooi	5,00	33,6	33,8	34,0	40,3
10_A	woning Eendenkooi	5,00	33,4	33,7	33,8	40,2
11_A	woning Eendenkooi	5,00	33,2	33,5	33,6	40,0
12_A	woning Hogeweg	5,00	33,8	34,1	34,2	40,6
13_A	woning Scharreweg	5,00	34,0	34,3	34,4	40,8
14_A	woning Zuidijk	5,00	31,5	31,7	31,9	38,2
15_A	woning Suisenweg	5,00	31,5	31,7	31,9	38,2
16_A	bedrijfswoning Meerzicht	5,00	33,8	34,1	34,2	40,6
17_A	woning Oude Tonge	5,00	30,7	31,0	31,1	37,5
18_A	woning Oude Tonge	5,00	30,7	30,9	31,1	37,4
19_A	woning Oude Tonge	5,00	30,6	30,8	31,0	37,3
20_A	woning Oude Tonge	5,00	30,7	30,9	31,1	37,4
21_A	woning Oude Tonge	5,00	32,3	32,5	32,7	39,0
31_A	overnachtingsplaatsen	5,00	51,1	51,3	51,4	57,8
32_A	overnachtingsplaatsen	5,00	52,2	52,4	52,5	58,9
33_A	overnachtingsplaatsen	5,00	52,8	53,1	53,3	59,6
34_A	overnachtingsplaatsen	5,00	51,8	52,0	52,2	58,5
35_A	MZI-, oester- en mosselperceel	1,50	41,6	41,8	42,0	48,3
36_A	MZI-, oester- en mosselperceel	1,50	44,7	44,9	45,1	51,4
37_A	MZI-, oester- en mosselperceel	1,50	44,8	45,1	45,2	51,6
38_A	MZI-, oester- en mosselperceel	1,50	47,3	47,5	47,7	54,0
39_A	MZI-, oester- en mosselperceel	1,50	49,9	50,1	50,3	56,6
40_A	MZI-, oester- en mosselperceel	1,50	49,3	49,5	49,7	56,0
41_A	MZI-, oester- en mosselperceel	1,50	49,2	49,4	49,6	55,9
42_A	MZI-, oester- en mosselperceel	1,50	36,5	36,8	36,9	43,3
43_A	MZI-, oester- en mosselperceel	1,50	45,9	46,1	46,3	52,6
44_A	MZI-, oester- en mosselperceel	1,50	50,0	50,2	50,4	56,7
45_A	MZI-, oester- en mosselperceel	1,50	51,4	51,7	51,8	58,2
46_A	MZI-, oester- en mosselperceel	1,50	51,8	52,1	52,2	58,6
47_A	MZI-, oester- en mosselperceel	1,50	52,3	52,5	52,7	59,0
48_A	MZI-, oester- en mosselperceel	1,50	50,8	51,0	51,1	57,5
49_A	MZI-, oester- en mosselperceel	1,50	50,7	50,9	51,1	57,4
50_A	MZI-, oester- en mosselperceel	1,50	51,5	51,7	51,9	58,2
51_A	MZI-, oester- en mosselperceel	1,50	49,5	49,7	49,9	56,2
52_A	MZI-, oester- en mosselperceel	1,50	42,2	42,5	42,6	49,0
53_A	MZI-, oester- en mosselperceel	1,50	39,3	39,5	39,7	46,0
54_A	MZI-, oester- en mosselperceel	1,50	37,0	37,2	37,4	43,7
55_A	MZI-, oester- en mosselperceel	1,50	34,7	34,9	35,1	41,4
56_A	terras restaurant Grevelingen	1,00	43,9	44,1	44,3	50,6
57_A	werkhaven	1,00	46,9	47,1	47,3	53,6

Alle getoonde dB-waarden zijn A-gewogen

Rapport: Resultatentabel
Model: 3. Dubbele wolk
L_{Aeq} totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	32,5	32,7	32,9	39,2
02_A	woning Battenoordseweg	5,00	30,7	30,9	31,1	37,4
03_A	woning Blaakweg	5,00	31,8	32,1	32,2	38,6
04_A	woning Oudelandsedijk	5,00	32,2	32,4	32,6	38,9
05_A	woning Noordweg	5,00	32,4	32,6	32,8	39,1
06_A	woning Langeweg	5,00	33,5	33,7	33,9	40,2
07_A	woning Hogeweg	5,00	33,6	33,8	34,0	40,3
08_A	bedrijfswoning restaurant Grevelingen	5,00	43,8	44,0	44,2	50,5
09_A	woning Eendenkooi	5,00	36,0	36,3	36,4	42,8
10_A	woning Eendenkooi	5,00	35,8	36,0	36,2	42,5
11_A	woning Eendenkooi	5,00	35,5	35,7	35,9	42,2
12_A	woning Hogeweg	5,00	33,2	33,4	33,6	39,9
13_A	woning Scharreweg	5,00	32,2	32,4	32,6	38,9
14_A	woning Zuidijk	5,00	32,0	32,2	32,4	38,7
15_A	woning Suisenweg	5,00	32,0	32,2	32,4	38,7
16_A	bedrijfswoning Meerzicht	5,00	36,7	36,9	37,1	43,4
17_A	woning Oude Tonge	5,00	31,5	31,7	31,9	38,2
18_A	woning Oude Tonge	5,00	31,6	31,8	32,0	38,3
19_A	woning Oude Tonge	5,00	31,4	31,7	31,8	38,2
20_A	woning Oude Tonge	5,00	31,6	31,8	32,0	38,3
21_A	woning Oude Tonge	5,00	32,8	33,0	33,2	39,5
31_A	overnachtingsplaatsen	5,00	52,4	52,6	52,8	59,1
32_A	overnachtingsplaatsen	5,00	51,6	51,8	52,0	58,3
33_A	overnachtingsplaatsen	5,00	51,9	52,1	52,3	58,6
34_A	overnachtingsplaatsen	5,00	53,2	53,4	53,6	60,0
35_A	MZI-, oester- en mosselperceel	1,50	46,3	46,5	46,7	53,0
36_A	MZI-, oester- en mosselperceel	1,50	51,3	51,5	51,7	58,0
37_A	MZI-, oester- en mosselperceel	1,50	49,5	49,7	49,9	56,2
38_A	MZI-, oester- en mosselperceel	1,50	48,9	49,2	49,4	55,7
39_A	MZI-, oester- en mosselperceel	1,50	49,7	50,0	50,2	56,5
40_A	MZI-, oester- en mosselperceel	1,50	49,8	50,0	50,2	56,6
41_A	MZI-, oester- en mosselperceel	1,50	48,3	48,5	48,7	55,0
42_A	MZI-, oester- en mosselperceel	1,50	38,2	38,5	38,6	45,0
43_A	MZI-, oester- en mosselperceel	1,50	53,7	53,9	54,1	60,4
44_A	MZI-, oester- en mosselperceel	1,50	51,7	51,9	52,1	58,4
45_A	MZI-, oester- en mosselperceel	1,50	55,4	55,6	55,8	62,1
46_A	MZI-, oester- en mosselperceel	1,50	54,8	55,0	55,2	61,5
47_A	MZI-, oester- en mosselperceel	1,50	51,9	52,1	52,3	58,6
48_A	MZI-, oester- en mosselperceel	1,50	48,3	48,6	48,7	55,1
49_A	MZI-, oester- en mosselperceel	1,50	48,0	48,3	48,4	54,8
50_A	MZI-, oester- en mosselperceel	1,50	52,3	52,5	52,7	59,0
51_A	MZI-, oester- en mosselperceel	1,50	49,2	49,4	49,6	55,9
52_A	MZI-, oester- en mosselperceel	1,50	44,0	44,2	44,4	50,7
53_A	MZI-, oester- en mosselperceel	1,50	41,1	41,4	41,5	47,9
54_A	MZI-, oester- en mosselperceel	1,50	38,6	38,8	38,9	45,3
55_A	MZI-, oester- en mosselperceel	1,50	36,4	36,6	36,8	43,1
56_A	terras restaurant Grevelingen	1,00	44,7	44,9	45,1	51,4
57_A	werkhaven	1,00	49,0	49,2	49,4	55,7

Alle getoonde dB-waarden zijn A-gewogen

Rapport: Resultatentabel
Model: 4. Grote wolk
LAeq totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	34,5	34,8	35,0	41,3
02_A	woning Battenoordseweg	5,00	32,7	32,9	33,1	39,5
03_A	woning Blaakweg	5,00	34,0	34,2	34,5	40,8
04_A	woning Oudelandsedijk	5,00	34,3	34,5	34,7	41,0
05_A	woning Noordweg	5,00	34,3	34,5	34,8	41,1
06_A	woning Langeweg	5,00	35,2	35,4	35,6	42,0
07_A	woning Hogeweg	5,00	35,3	35,5	35,7	42,1
08_A	bedrijfswoning restaurant Grevelingen	5,00	47,6	47,8	48,0	54,3
09_A	woning Eendenkooi	5,00	37,8	38,0	38,2	44,5
10_A	woning Eendenkooi	5,00	37,6	37,8	38,0	44,3
11_A	woning Eendenkooi	5,00	37,3	37,6	37,8	44,1
12_A	woning Hogeweg	5,00	34,9	35,1	35,3	41,6
13_A	woning Scharreweg	5,00	33,6	33,8	34,1	40,4
14_A	woning Zuidijk	5,00	33,7	33,9	34,1	40,5
15_A	woning Suisenweg	5,00	33,6	33,8	34,0	40,4
16_A	bedrijfswoning Meerzicht	5,00	38,9	39,1	39,3	45,6
17_A	woning Oude Tonge	5,00	33,7	33,9	34,1	40,5
18_A	woning Oude Tonge	5,00	33,8	34,1	34,3	40,6
19_A	woning Oude Tonge	5,00	33,7	33,9	34,1	40,4
20_A	woning Oude Tonge	5,00	33,8	34,1	34,3	40,6
21_A	woning Oude Tonge	5,00	34,5	34,8	35,0	41,3
31_A	overnachtingsplaatsen	5,00	51,6	51,8	52,1	58,4
32_A	overnachtingsplaatsen	5,00	50,8	51,0	51,2	57,5
33_A	overnachtingsplaatsen	5,00	50,8	51,0	51,2	57,6
34_A	overnachtingsplaatsen	5,00	51,3	51,5	51,8	58,1
35_A	MZI-, oester- en mosselperceel	1,50	45,9	46,1	46,4	52,7
36_A	MZI-, oester- en mosselperceel	1,50	50,0	50,3	50,5	56,8
37_A	MZI-, oester- en mosselperceel	1,50	48,7	48,9	49,2	55,5
38_A	MZI-, oester- en mosselperceel	1,50	48,2	48,5	48,7	55,0
39_A	MZI-, oester- en mosselperceel	1,50	48,8	49,1	49,3	55,6
40_A	MZI-, oester- en mosselperceel	1,50	48,8	49,0	49,2	55,5
41_A	MZI-, oester- en mosselperceel	1,50	47,3	47,6	47,8	54,1
42_A	MZI-, oester- en mosselperceel	1,50	41,6	41,8	42,1	48,4
43_A	MZI-, oester- en mosselperceel	1,50	51,4	51,7	51,9	58,2
44_A	MZI-, oester- en mosselperceel	1,50	51,1	51,3	51,6	57,9
45_A	MZI-, oester- en mosselperceel	1,50	53,2	53,4	53,7	60,0
46_A	MZI-, oester- en mosselperceel	1,50	53,1	53,3	53,5	59,8
47_A	MZI-, oester- en mosselperceel	1,50	51,8	52,0	52,3	58,6
48_A	MZI-, oester- en mosselperceel	1,50	50,8	51,0	51,2	57,6
49_A	MZI-, oester- en mosselperceel	1,50	51,8	52,0	52,2	58,5
50_A	MZI-, oester- en mosselperceel	1,50	51,6	51,8	52,1	58,4
51_A	MZI-, oester- en mosselperceel	1,50	51,2	51,4	51,6	57,9
52_A	MZI-, oester- en mosselperceel	1,50	48,1	48,4	48,6	54,9
53_A	MZI-, oester- en mosselperceel	1,50	45,2	45,4	45,6	51,9
54_A	MZI-, oester- en mosselperceel	1,50	42,4	42,6	42,8	49,2
55_A	MZI-, oester- en mosselperceel	1,50	39,5	39,7	39,9	46,3
56_A	terras restaurant Grevelingen	1,00	49,3	49,5	49,7	56,0
57_A	werkhaven	1,00	49,8	50,1	50,3	56,6

Alle getoonde dB-waarden zijn A-gewogen

Rapport: Resultatentabel
Model: 5. Wolk
L_{Aeq} totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

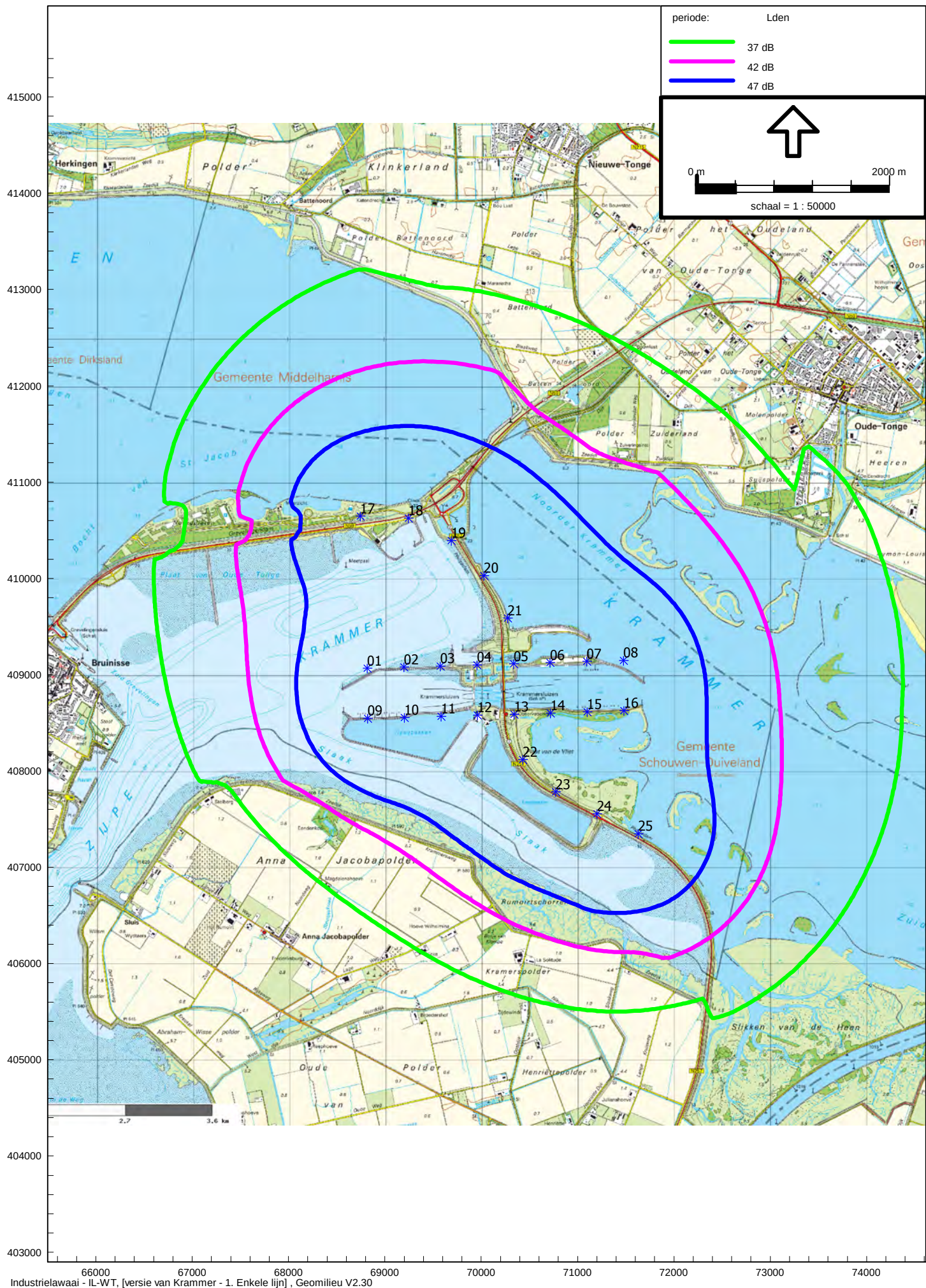
Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	32,2	32,4	32,6	38,9
02_A	woning Battenoordseweg	5,00	27,0	27,3	27,4	33,8
03_A	woning Blaakweg	5,00	29,0	29,2	29,4	35,7
04_A	woning Oudelandsedijk	5,00	30,7	30,9	31,1	37,4
05_A	woning Noordweg	5,00	32,2	32,5	32,6	39,0
06_A	woning Langeweg	5,00	33,4	33,6	33,8	40,1
07_A	woning Hogeweg	5,00	33,5	33,7	33,9	40,2
08_A	bedrijfswoning restaurant Grevelingen	5,00	37,8	38,0	38,2	44,5
09_A	woning Eendenkooi	5,00	35,9	36,2	36,3	42,7
10_A	woning Eendenkooi	5,00	35,7	35,9	36,1	42,4
11_A	woning Eendenkooi	5,00	35,4	35,6	35,8	42,1
12_A	woning Hogeweg	5,00	33,1	33,3	33,5	39,8
13_A	woning Scharreweg	5,00	32,1	32,3	32,5	38,8
14_A	woning Zuidijk	5,00	31,0	31,2	31,4	37,7
15_A	woning Suisenweg	5,00	31,1	31,3	31,5	37,9
16_A	bedrijfswoning Meerzicht	5,00	31,5	31,7	31,9	38,2
17_A	woning Oude Tonge	5,00	29,7	30,0	30,1	36,5
18_A	woning Oude Tonge	5,00	29,5	29,7	29,9	36,2
19_A	woning Oude Tonge	5,00	29,5	29,7	29,9	36,2
20_A	woning Oude Tonge	5,00	29,4	29,6	29,8	36,1
21_A	woning Oude Tonge	5,00	31,8	32,0	32,2	38,5
31_A	overnachtingsplaatsen	5,00	52,4	52,6	52,8	59,1
32_A	overnachtingsplaatsen	5,00	51,6	51,8	52,0	58,3
33_A	overnachtingsplaatsen	5,00	51,9	52,1	52,3	58,6
34_A	overnachtingsplaatsen	5,00	53,2	53,4	53,6	60,0
35_A	MZI-, oester- en mosselperceel	1,50	46,3	46,5	46,7	53,0
36_A	MZI-, oester- en mosselperceel	1,50	51,3	51,5	51,6	58,0
37_A	MZI-, oester- en mosselperceel	1,50	49,5	49,7	49,8	56,2
38_A	MZI-, oester- en mosselperceel	1,50	48,9	49,2	49,3	55,7
39_A	MZI-, oester- en mosselperceel	1,50	49,7	50,0	50,1	56,5
40_A	MZI-, oester- en mosselperceel	1,50	49,8	50,0	50,2	56,5
41_A	MZI-, oester- en mosselperceel	1,50	48,3	48,5	48,7	55,0
42_A	MZI-, oester- en mosselperceel	1,50	37,5	37,7	37,9	44,2
43_A	MZI-, oester- en mosselperceel	1,50	53,7	53,9	54,1	60,4
44_A	MZI-, oester- en mosselperceel	1,50	51,7	51,9	52,1	58,4
45_A	MZI-, oester- en mosselperceel	1,50	55,4	55,6	55,8	62,1
46_A	MZI-, oester- en mosselperceel	1,50	54,8	55,0	55,2	61,5
47_A	MZI-, oester- en mosselperceel	1,50	51,8	52,0	52,2	58,5
48_A	MZI-, oester- en mosselperceel	1,50	47,6	47,8	48,0	54,3
49_A	MZI-, oester- en mosselperceel	1,50	42,6	42,8	43,0	49,3
50_A	MZI-, oester- en mosselperceel	1,50	38,7	38,9	39,1	45,4
51_A	MZI-, oester- en mosselperceel	1,50	40,2	40,4	40,6	46,9
52_A	MZI-, oester- en mosselperceel	1,50	38,8	39,0	39,2	45,5
53_A	MZI-, oester- en mosselperceel	1,50	38,2	38,4	38,6	44,9
54_A	MZI-, oester- en mosselperceel	1,50	37,1	37,4	37,5	43,9
55_A	MZI-, oester- en mosselperceel	1,50	35,5	35,8	35,9	42,3
56_A	terras restaurant Grevelingen	1,00	40,0	40,3	40,4	46,8
57_A	werkhaven	1,00	37,8	38,1	38,2	44,6

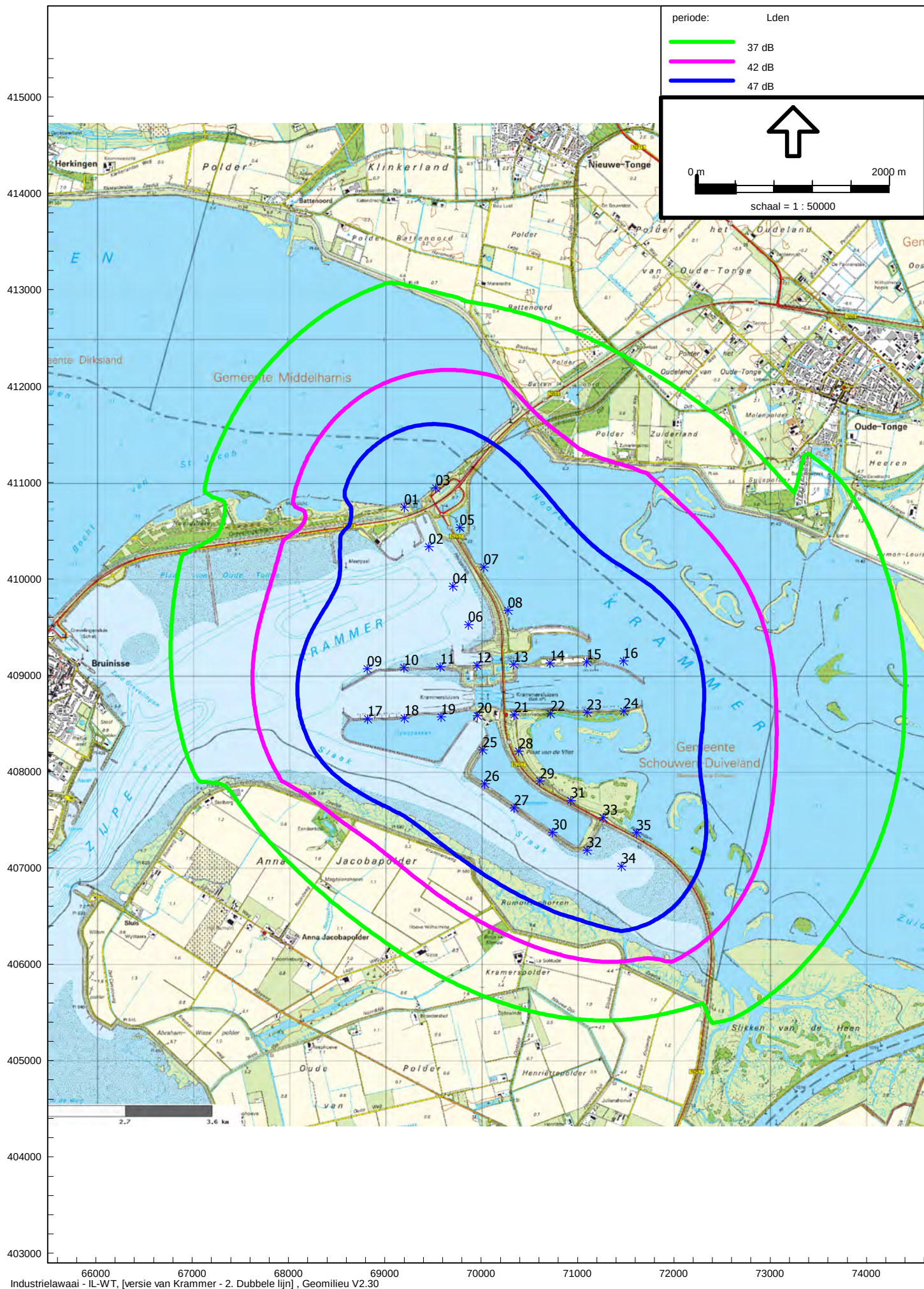
Alle getoonde dB-waarden zijn A-gewogen

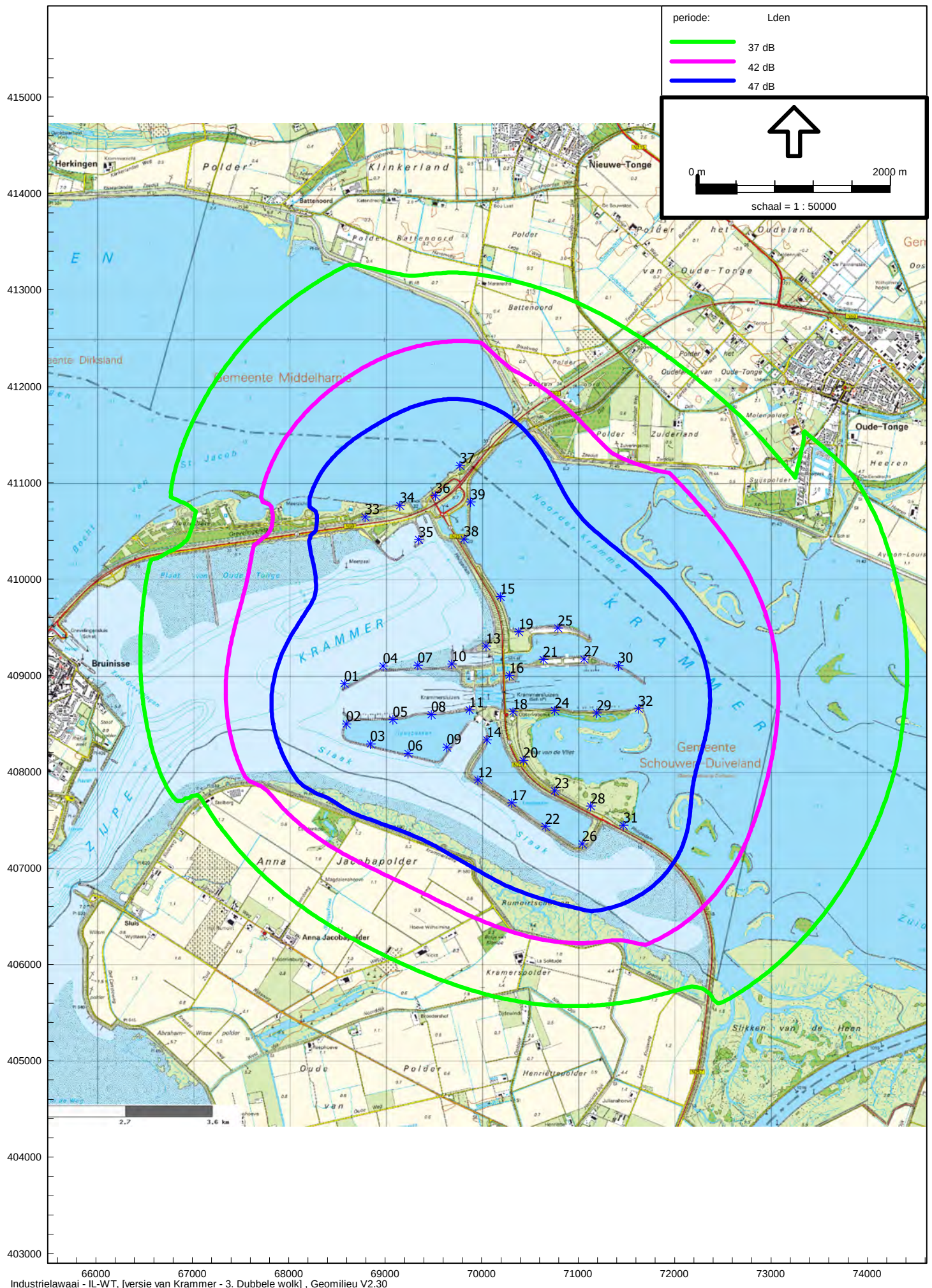
Rapport: Resultatentabel
Model: 6. VKA
LAeq totaalresultaten voor toetspunten
Groep: (hoofdgroep)
Groepsreductie: Ja

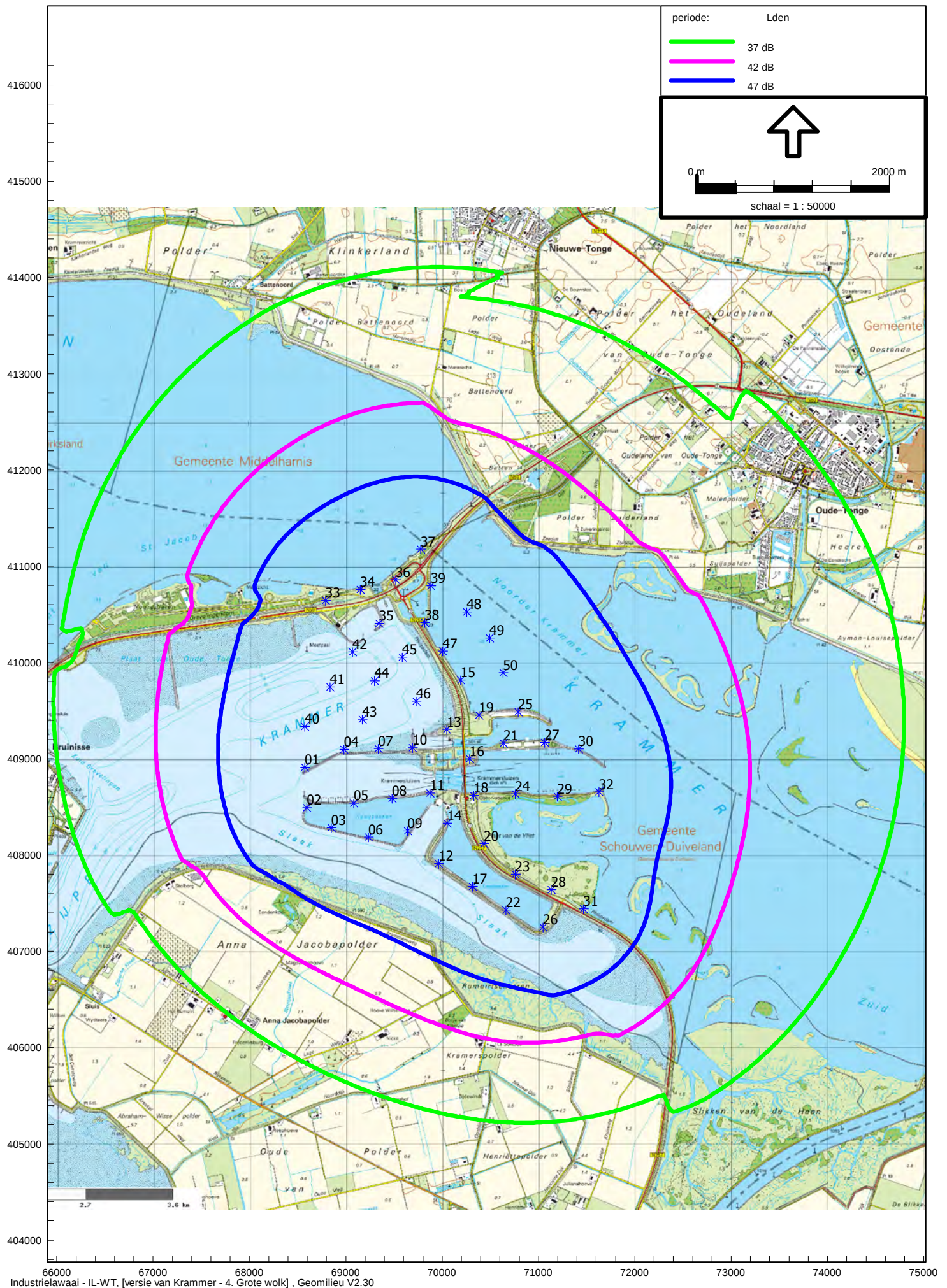
Naam Toetspunt	Omschrijving	Hoogte	Dag	Avond	Nacht	Lden
01_A	woning Sluisweg	5,00	33,7	33,9	34,1	40,4
02_A	woning Battenoordseweg	5,00	29,8	30,1	30,3	36,6
03_A	woning Blaakweg	5,00	31,2	31,4	31,7	38,0
04_A	woning Oudelandsedijk	5,00	31,9	32,1	32,3	38,6
05_A	woning Noordweg	5,00	33,8	34,0	34,2	40,5
06_A	woning Langeweg	5,00	34,9	35,1	35,3	41,7
07_A	woning Hogeweg	5,00	35,1	35,3	35,5	41,9
08_A	bedrijfswoning restaurant Grevelingen	5,00	43,2	43,4	43,6	50,0
09_A	woning Eendenkooi	5,00	37,4	37,6	37,8	44,2
10_A	woning Eendenkooi	5,00	37,2	37,4	37,6	43,9
11_A	woning Eendenkooi	5,00	37,0	37,2	37,4	43,7
12_A	woning Hogeweg	5,00	34,6	34,9	35,1	41,4
13_A	woning Scharreweg	5,00	33,3	33,5	33,7	40,1
14_A	woning Zuidijk	5,00	31,8	32,0	32,2	38,6
15_A	woning Suisenweg	5,00	31,8	32,1	32,3	38,6
16_A	bedrijfswoning Meerzicht	5,00	34,4	34,6	34,8	41,2
17_A	woning Oude Tonge	5,00	31,2	31,4	31,7	38,0
18_A	woning Oude Tonge	5,00	31,2	31,4	31,6	38,0
19_A	woning Oude Tonge	5,00	31,1	31,3	31,6	37,9
20_A	woning Oude Tonge	5,00	31,2	31,4	31,6	37,9
21_A	woning Oude Tonge	5,00	32,5	32,7	32,9	39,2
31_A	overnachtingsplaatsen	5,00	51,3	51,5	51,7	58,0
32_A	overnachtingsplaatsen	5,00	51,7	52,0	52,2	58,5
33_A	overnachtingsplaatsen	5,00	50,9	51,2	51,4	57,7
34_A	overnachtingsplaatsen	5,00	51,4	51,6	51,8	58,1
35_A	MZI-, oester- en mosselperceel	1,50	45,6	45,8	46,0	52,3
36_A	MZI-, oester- en mosselperceel	1,50	49,8	50,0	50,2	56,5
37_A	MZI-, oester- en mosselperceel	1,50	48,5	48,8	49,0	55,3
38_A	MZI-, oester- en mosselperceel	1,50	48,2	48,4	48,7	55,0
39_A	MZI-, oester- en mosselperceel	1,50	48,8	49,0	49,3	55,6
40_A	MZI-, oester- en mosselperceel	1,50	48,6	48,9	49,1	55,4
41_A	MZI-, oester- en mosselperceel	1,50	47,5	47,7	48,0	54,3
42_A	MZI-, oester- en mosselperceel	1,50	38,3	38,5	38,7	45,0
43_A	MZI-, oester- en mosselperceel	1,50	51,3	51,6	51,8	58,1
44_A	MZI-, oester- en mosselperceel	1,50	50,2	50,4	50,7	57,0
45_A	MZI-, oester- en mosselperceel	1,50	51,9	52,2	52,4	58,7
46_A	MZI-, oester- en mosselperceel	1,50	52,0	52,2	52,4	58,8
47_A	MZI-, oester- en mosselperceel	1,50	50,2	50,5	50,7	57,0
48_A	MZI-, oester- en mosselperceel	1,50	45,2	45,4	45,6	52,0
49_A	MZI-, oester- en mosselperceel	1,50	45,9	46,1	46,3	52,7
50_A	MZI-, oester- en mosselperceel	1,50	49,1	49,3	49,6	55,9
51_A	MZI-, oester- en mosselperceel	1,50	45,2	45,4	45,6	51,9
52_A	MZI-, oester- en mosselperceel	1,50	41,6	41,8	42,1	48,4
53_A	MZI-, oester- en mosselperceel	1,50	39,8	40,0	40,2	46,6
54_A	MZI-, oester- en mosselperceel	1,50	38,2	38,4	38,7	45,0
55_A	MZI-, oester- en mosselperceel	1,50	36,5	36,7	36,9	43,3
56_A	terras restaurant Grevelingen	1,00	43,5	43,7	43,9	50,2
57_A	werkhaven	1,00	47,1	47,3	47,6	53,9

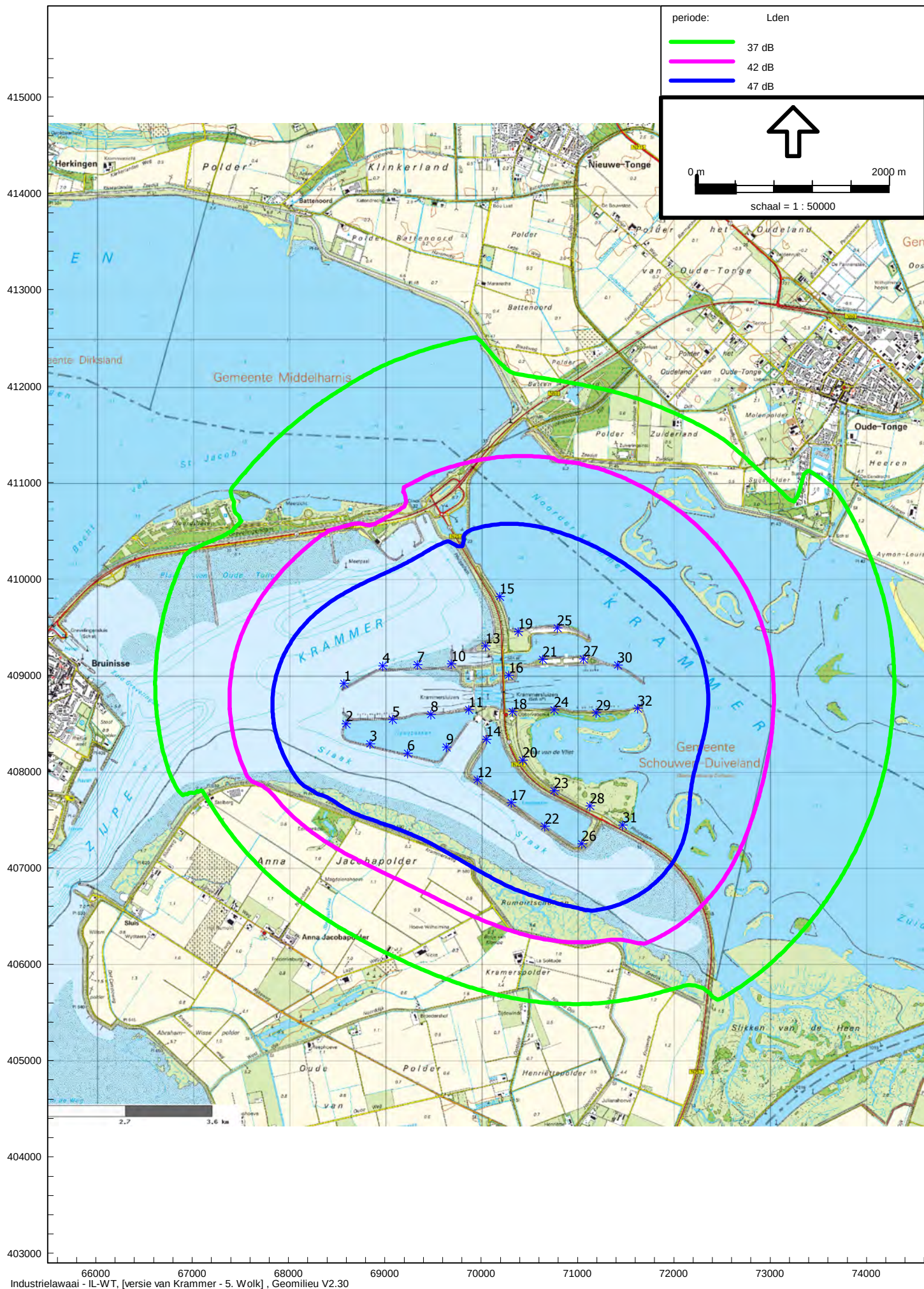
Alle getoonde dB-waarden zijn A-gewogen

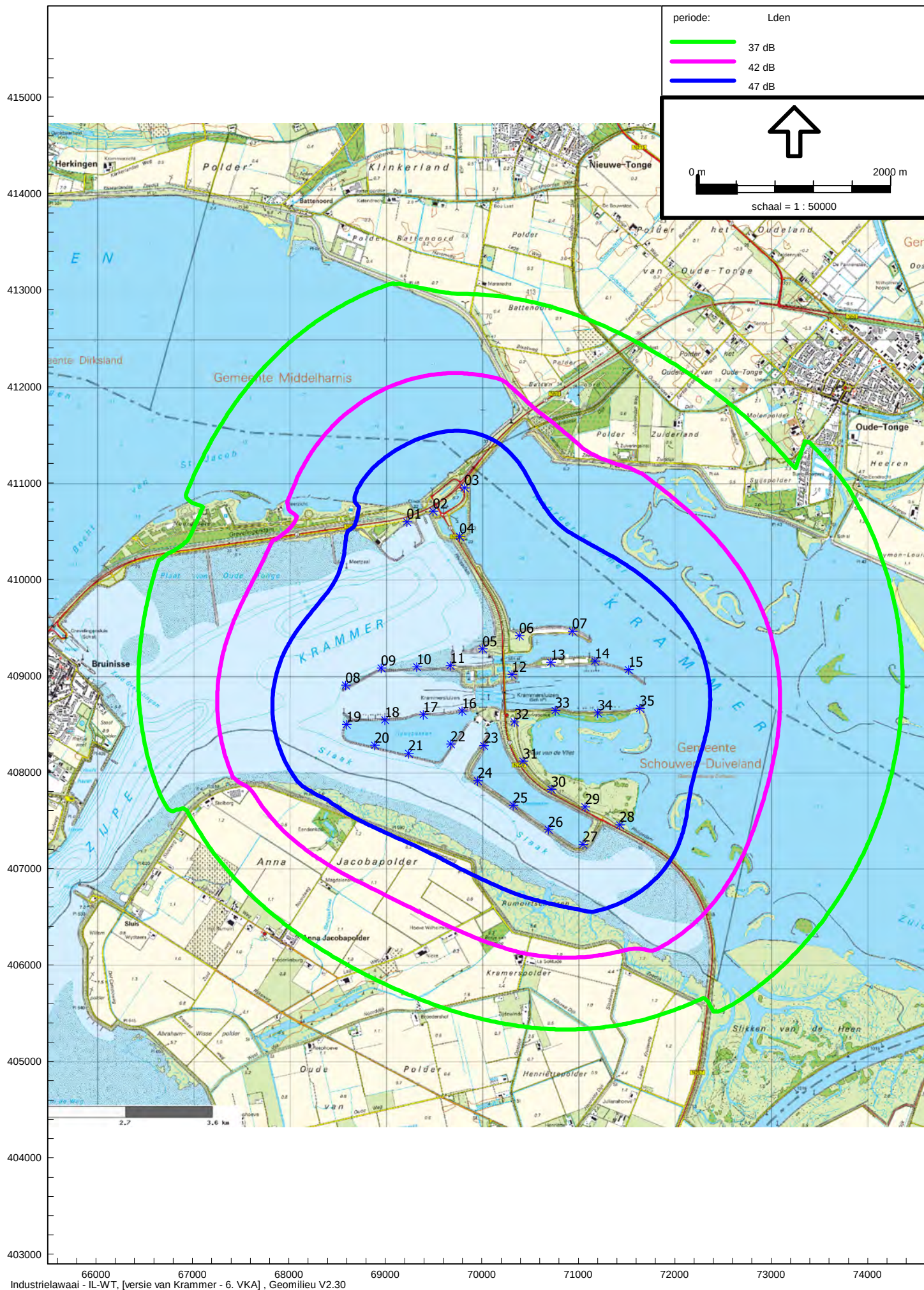












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