

Appendix B: Shadow Flicker Assessment

Burchill Wind Project
Shadow Flicker Assessment
February 2020



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1. Introduction

Natural Forces has undertaken a shadow flicker impact assessment for the proposed Burchill Wind Project to assess the potential impact of shadow flicker on the surrounding shadow receptors. Details outlining the shadow receptors, prediction methodology, and model assumptions made for the assessment are included here, with the detailed windPRO software results included in Appendix B and Appendix C. This report also provides background information on the shadow flicker effect.

Under the *Additional Information Requirements for Wind Turbines* document published by the New Brunswick Ministry of Environment and Local Government pursuant to Section 5(2) of the *Environmental Impact Assessment Regulation* of the Clean Environment Act, requirements for visual impacts due to shadow flicker must be limited to 30 hours per year for a maximum of 30 minutes per day based on a “worst case” calculation where mitigation is not feasible. The worst case calculation is defined in the requirements document as the maximum shadow between sunrise and sunset on a cloudless day. These conditions have been adopted for this study, along with more realistic conditions for comparison.

Prior to determining the predicted amount of shadow flicker effect of a project, careful site design is recommended, followed by industry accepted mitigation strategies. This assessment will be used as supporting documentation to demonstrate that shadow flicker is being assessed and that compliance can be reached with careful planning and mitigation.

This shadow flicker analysis was conducted using the Shadow module of the software package, windPRO version 3.1.

1.1. Background

Flicker is caused by incident light rays on a moving object which then casts an intermittent shadow on a receptor. This intermittent shadow, perceived as a change in light intensity by an observer, as it pertains to a wind turbine generator (WTG), is referred to as shadow flicker. Shadow flicker is caused by incident sun rays on the rotor blades as they turn.

For shadow flicker to occur, the following criteria must be met:

1. The sun must be shining and not obscured by any cloud cover or fog.
2. The wind turbine must be between the sun and the shadow receptor.
3. The line of sight between the turbine and the shadow receptor must be clear. Light-impermeable obstacles, such as vegetation, buildings, awnings etc., will prevent shadow flicker from occurring at the receptor.
4. The shadow receptor must be close enough to the turbine to be in the shadow of the rotor.

1.2. Policy and Guidelines

In New Brunswick, there are provincial requirements for the acceptable amount of shadow flicker that can be experienced at a receptor. These requirements are set out in the *Additional Information Requirements for Wind Turbines* document published by New Brunswick Ministry of Environment and Local Government pursuant to Section 5(2) of the *Environmental Impact Assessment Regulation* of the Clean Environment Act.

Under these requirements, mitigation measures should be applied to minimize the shadow flicker effect on sensitive receptors. These mitigation measures can include relocation of turbines, screening of the receptors, and operational controls. Where the proponent demonstrates that the mitigation of any shadow flicker effect on sensitive receptors is not feasible, the amount of shadow flicker must be limited to:

- 30 hours per year for a maximum “worst case” calculation; and
- 30 minutes per day for a maximum “worst case” calculation.

The requirements also state that the “worst case” scenario describes a model that considers maximum shadow between sunrise and sunset and assumes cloudless skies throughout the year.

1.3. Source of Shadow

The proposed Burchill Wind Project is composed of 10 WTGs located roughly 15 kilometres southwest of the City of Saint John. A map of the project area with the proposed WTG layout is included in Appendix A.

There are no existing or proposed wind farms within 10 km of the proposed Burchill Wind Project; therefore, it is unlikely any cumulative WTG shadow flicker effects will occur external to the project.

The model of WTG being considered for the proposed wind project is the Enercon E-141 EP4, 4.2 MW machine. The E-141 turbines have a 141 m rotor diameter with a hub height of 135 m. This turbine model uses a horizontal axis, upwind, three blades, and a microprocessor pitch control system. Table 1 below outlines the main characteristics of this WTG model.

Table 1: Enercon E-141, 4.2 MW turbine characteristics.

Generator Type	Rotor Diameter (m)	Hub Height (m)	Swept area (m ²)	Rated Output (MW)
E-141 EP4	141	135	15,615	4.2

1.4. Receptors

There are 510 points of reception taken into consideration for this shadow flicker assessment. The receptors are mostly residential buildings, industrial buildings, and a few local businesses within 4 km of the proposed WTGs. They have been identified based on online geographical data from the Data Catalogue available on the Service New Brunswick website and cross referenced with aerial photography, as well as site visits. The geographic coordinates of the receptors are included in Appendix B. A map of the project area with the receptors is included in Appendix A.

2. Shadow Flicker Impact Assessment Methodology

The shadow flicker impact was calculated for the 10-turbine layout at each of the 510 receptors using the Shadow module of the software package windPRO version 3.1. This was carried out using different methodologies for the worst case and realistic scenarios, detailed below, to calculate the expected hours per year and maximum minutes per day of shadow flicker from the project for each receptor.

2.1. Worst Case Shadow Flicker Assessment

The worst case shadow flicker assessment follows a conservative methodology by modelling the Earth's orbit and rotation to provide the astronomical maximum shadow. The astronomical maximum shadow calculation assumes that for every day of the year:

1. The sky is cloudless between sunrise and sunset;
2. The turbines are always in operation; and,
3. The wind direction changes throughout the day such that the rotor plane is perpendicular to the incident sun rays at all times causing the maximum amount of shadow.

The position of the sun relative to the wind turbine rotor plane and the resulting shadow is calculated in steps of one-minute intervals throughout a complete year. If the rotor plane, assumed to be a solid disk equivalent in size to the swept area shown in Table 1 casts a shadow on a receptor window during one of these intervals, it is registered as one minute of potential shadow impact.

The impact of shadow flicker on surrounding receptors is limited by two factors in this worst case scenario. The first factor is that the angle of the sun over the horizon must be greater than 3 degrees, due to optic conditions in the atmosphere that cause the shadow to dissipate before it could potentially reach a receptor. The second factor is that the blade of the wind turbine must cover at least 20% of the incident solar rays in order to have a noticeable effect.

To further ensure the worst case scenario is being modelled, each receptor is treated as a greenhouse with 3.0 m high by 3.0 m wide windows for 360° of the building. Furthermore, no topographical or ground cover shielding caused by buildings, barns, trees, awnings, etc. has been considered between the wind turbines and receptors. This worst-case assumption results in a conservative prediction of the potential shadow flicker impacts, meaning that the shadow flicker impacts from the assessment are likely calculated as higher than they would be experienced.

2.2. Realistic Case Shadow Flicker Assessment

The realistic case shadow flicker assessment provides a model much closer to the actual conditions of the project site and the surrounding receptors. In this case, the Shadow module was used with the 'Real case based on statistics' option, which incorporates WTG operational hours and monthly sunshine probabilities into the model.

The input value for WTG operational hours was determined based on the average operational hours of all Natural Forces' existing operational turbines. On average, our turbines are operational, meaning that they are spinning, 95.17% of the time, which amounts to approximately 8,337 hours/year. Note that this does not take into account site-specific wind direction and therefore still remains a conservative model.

The monthly sunshine probabilities were input as the average daily hours of sunlight – the number of daylight hours during which sunny conditions are experienced. The input values for each month are listed in Table 2. Values were manually input because the nearest weather station in windPRO with sunlight data is Fredericton, NB, which is approximately 80 km from the site and experiences longer sunlight hours than Saint John.

Table 2: Average daily sunlight hours for Saint John, NB.¹

Month	Average Daily Sunlight Hours
January	3.42
February	4.35
March	4.90
April	5.30
May	6.50
June	6.67
July	7.22
August	6.67
September	5.53
October	4.80
November	3.13
December	3.22

The two receptors that were shown in the worst case scenario to experience shadow flicker levels exceeding the requirements were also modelled more realistically. Rather than treating each receptor as a greenhouse, the window height, width, and orientation (measured as degrees from south) were input based on data collected during a site visit. The inputs for all windows for these buildings facing the project are included below in Table 3.

Table 3: windPRO inputs for windows on the two buildings most impacted by shadow flicker.

Receptor	Window Description	Window Height Above Ground (m)	Window Height (m)	Window Width (m)	Window Orientation (degrees from south)
A: Simpson Truck and Tractor Parts	Long side of building, lower windows	1.0	1.0	3.0	12
B: GFL Environmental	Long side of building, upper warehouse windows	5.5	1.0	1.0	32
C: Simpson Truck and Tractor Parts	Long side of building,	4.0	1.0	3.0	12

¹ Average daily sunlight hours were taken from: Climatemps. *Sunshine & Daylight Hours in Saint John, New Brunswick, Canada*. Web: <http://www.saint-john.climatemps.com/sunlight.php>

	upper windows				
D: Simpson Truck and Tractor Parts	Short side of building, lower window	1.0	1.0	3.0	102
E: Simpson Truck and Tractor Parts	Short side of building, upper window	4.0	1.0	3.0	102
F: GFL Environmental	Long side of building, lower windows	1.0	1.0	1.0	32
G: GFL Environmental	Short side of building, lower windows	1.0	1.0	1.0	122
H: GFL Environmental	Short side of building, upper warehouse windows	5.5	1.0	1.0	122

3. Results of Shadow Flicker Impact Assessment

The results of the shadow flicker prediction model at each receptor are used to demonstrate compliance with the New Brunswick requirements of no more than 30 hours per year of shadow, and no more than 30 minutes on the worst day of shadow under a realistic scenario.

The worst-case study of this project demonstrates that all but two of the receptors located within 4 km of the 10 WTG project layout are subject to no more than 30 hr/year and 30 min/day of shadow flicker. The detailed results of the shadow assessment study for all receptors in a worst case scenario are included in Appendix B.

The results show that of 510 receptors, 92 are predicted to experience shadow flicker under worst-case scenario conditions. Table 3 shows the results for the receptors that are predicted to experience 21+ hr/year of shadow flicker.

Table 3: Predicted worst case shadow flicker for E-141 at 135 m hub height for receptors predicted to experience 21+ hr/year of shadow flicker.

Receptor	Worst Case Shadow Hours per Year (hr/year)	Worst Case Max Shadow Hours per Day (hr/day)	Compliance with New Brunswick's Requirements
F	223:17	1:07	No
E	107:52	0:51	No
DV	26:29	0:22	Yes
EN	24:59	0:21	Yes
DW	23:39	0:20	Yes
CZ	22:18	0:25	Yes
NL	21:42	0:27	Yes
EB	21:05	0:23	Yes
IF	20:45	0:26	Yes
BR	20:32	0:23	Yes
BK	19:58	0:22	Yes
NK	19:52	0:26	Yes
IL	19:51	0:21	Yes
IE	19:45	0:26	Yes
BV	18:51	0:23	Yes
BN	18:30	0:21	Yes
IK	18:03	0:22	Yes
IH	17:41	0:22	Yes
CA	17:16	0:23	Yes
BC	16:43	0:20	Yes
II	16:07	0:21	Yes
BJ	15:25	0:21	Yes

DU	15:29	0:21	Yes
FB	15:10	0:22	Yes
DP	15:04	0:21	Yes

The receptors exceeding the requirements are two buildings in the Spruce Lake Industrial Park. These buildings are owned by Simpson Truck & Tractor Parts (receptor E) and GFL Environmental (receptor F). The GFL Environmental building is a warehouse-style building with very few, small windows. The Simpson Truck & Tractor Parts building is an office/warehouse style building with narrow horizontal windows. Photos of these buildings are included in Figure 1 and Figure 2.



Figure 1: The Simpson Truck and Tractor Parts building (receptor E).



Figure 2: The GFL Environmental building (receptor F).

The realistic study, which considers the size of the windows for these two buildings, demonstrates that neither building is expected to experience shadow flicker exceeding 30 hr/year. The detailed results of this realistic case shadow flicker assessment for these two buildings is included in Appendix C and are summarized in Table 4. These results demonstrate that under realistic atmospheric and site conditions, neither of these two industrial buildings are predicted to experience shadow flicker that exceeds the requirements.

Though these realistic results do satisfy the provincial requirements, there are certain mitigation measures that can be implemented if needed, which are explored in Section 4.

Table 4: Predicted realistic case shadow flicker for E-141 WTGs with 135 m hub height for receptors predicted to have the most impact based on a worst case scenario.

Receptor	Window Description	Realistic Case Shadow Hours per Year (hr/year)
A: Simpson Truck and Tractor Parts	Long side of building, lower windows	12:15
B: GFL Environmental	Long side of building, upper warehouse windows	27:29
C: Simpson Truck and Tractor Parts	Long side of building, upper windows	9:37
D: Simpson Truck and Tractor Parts	Short side of building, lower window	7:07
E: Simpson Truck and Tractor Parts	Short side of building, upper window	6:15
F: GFL Environmental	Long side of building, lower windows	19:52
G: GFL Environmental	Short side of building, lower windows	12:42
H: GFL Environmental	Short side of building, upper warehouse windows	6:37

4. Proposed Mitigation

As required in the *Additional Information Requirements for Wind Turbines* report for New Brunswick, this shadow flicker assessment report also provides a description of the mitigation measures to be used to mitigate effects on sensitive receptors should they experience shadow flicker. These measures described in the following sections include tracking the events and screening of receptors using vegetation and awnings.

4.1. Tracking the Shadow Flicker

Should receptors experience shadow flicker and formalize a complaint, the complaint will be addressed following the Complaint Resolution Plan. The steps included in the Complaint Resolution Plan describe the study that will occur following a complaint. To begin, the specific date, time, and local weather conditions will be noted for each incident of shadow flicker as well as the duration of the event. Following this step, the Operation Team for the project will determine the direction of the wind relative to the receptor and the wind speed during the event. Finally, the details of the event will be tracked to analyze the specific conditions that cause shadow flicker at a receptor.

If the conditions causing shadow flicker are reoccurring and causing issues at the receptor, screening using vegetation and awnings may be considered to mitigate the situation.

4.2. Screening

Screening efforts are a feasible and effective mitigation measure for reducing shadow flicker impact. It is proposed that if receptors experience an annoyingly high amount of shadow flicker impact during operation, the Proponent could use screening methods that will provide shade to buildings and windows, effectively reducing shadow flicker annoyance.

Screening can be accomplished with existing vegetation, revegetation, and planting additional vegetation to the area which is experiencing shadow flicker. Similar, and sometimes better, results can be obtained by installing awnings and window if it would be preferred by those experiencing the impact.

5. Discussion and Conclusions

Natural Forces has completed an assessment to evaluate the shadow flicker impact of the proposed Burchill Wind Project at receptor locations within 4 km of the proposed WTGs.

Based on the worst case modelled results, the amount of shadow flicker predicted at each receptor, aside from two industrial buildings, will pass the requirements set out by New Brunswick's Ministry of Environment and Local Government. Based on the realistic modelled results, these two industrial buildings also will pass the requirements.

As per the *Additional Information Requirements for Wind Turbines* document published by New Brunswick Ministry of Environment and Local Government pursuant to Section 5(2) of the *Environmental Impact Assessment Regulation* of the Clean Environment Act, various measures may be used to mitigate effect of shadow flicker perceived at receptors. These mitigation methods may include tracking shadow flicker events and screening of receptors using natural barriers, awnings, or other structures.

The Proponent feels confident that receptors will not receive exceeding amounts of shadow flicker as demonstrated in the modelled worst-case and realistic scenarios. However, the Proponent will work closely with land and businesses owners to observe occurrences of real-case shadow flicker impact during operation and apply mitigation as mentioned.

References

Climateemps. *Sunshine & Daylight Hours in Saint John, New Brunswick, Canada*. Web: <http://www.saint-john.climateemps.com/sunlight.php>

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New Brunswick Ministry of Environment and Local Government. *Environmental Impact Assessment Regulation – Clean Environment Act*. New Brunswick.

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Nielson, P. (2012). *Windpro 3.1 user guide*. (1st ed.). Denmark: EMD International A/S.

WEA-Schattenwurf-Hinweise (2002). *Hinweise zur Ermittlung und Beurteilung der optischen Immissionen von Windenergieanlagen (Notes on the identification and assessment of the optical pollutions of Wind Turbines)*

APPENDIX A:

Project Layout Map with Shadow Lines

Burchill Wind Project Shadow Flicker Assessment

Legend

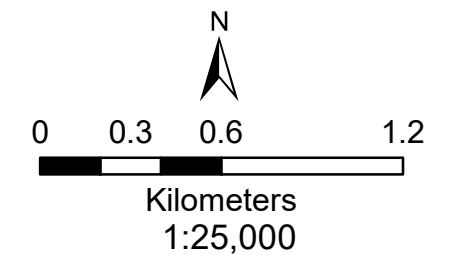
- Proposed Turbine Locations
- Residences
- Industrial Buildings

Worst Case Annual Hours of Shadow Flicker:

- 0 hr/year
- 10 hr/year
- 20 hr/year
- 25 hr/year
- 30 hr/year
- 35 hr/year
- 40 hr/year

Realistic Case Annual Hours of Shadow Flicker:

- 0 hr/year
- 10 hr/year
- 20 hr/year
- 25 hr/year
- 30 hr/year
- 35 hr/year
- 40 hr/year



Coordinate System: UTM Zone 19, Northern Hemisphere

Date: February 4, 2020

natural forces

APPENDIX B:

WindPRO v3.1, Shadow Module Calculation Results
Worst Case

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

Assumptions for shadow calculations

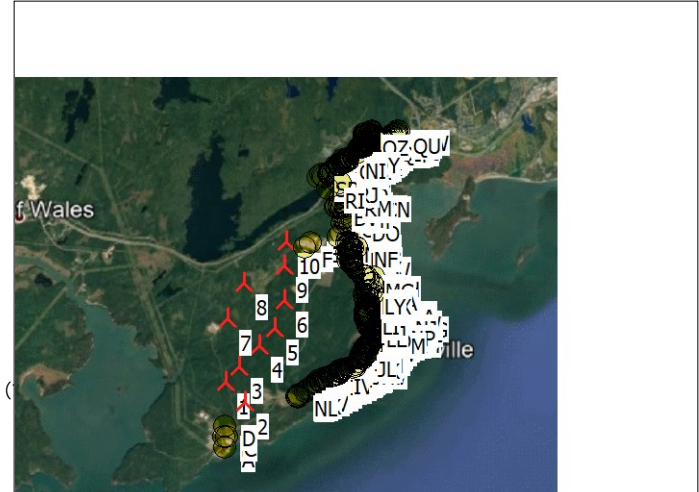
Maximum distance for influence
 Calculate only when more than 20 % of sun is covered by the blade
 Please look in WTG table

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

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

Height contours used: Height Contours: CONTOURLINE_Birchill August 2018_19.wpo (Obstacles used in calculation)
 Eye height: 1.5 m
 Grid resolution: 10.0 m

All coordinates are in UTM (north)-NAD83 (US+CA) Zone: 19



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

WTGs

Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	719,709	5,005,535	64.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
2	720,289	5,005,088	53.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
3	720,016	5,005,984	77.3 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
4	720,470	5,006,608	68.4 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
5	720,839	5,007,111	61.6 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
6	720,981	5,007,866	52.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
7	719,557	5,007,215	54.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
8	719,859	5,008,188	58.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
9	720,873	5,008,786	62.9 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
10	720,849	5,009,426	65.8 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO...Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
	[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A	719,904	5,003,839	14.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
B	719,848	5,004,109	26.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
C	719,918	5,004,111	22.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
D	719,846	5,004,387	30.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
E	721,483	5,009,479	49.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
F	721,351	5,009,324	56.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
G	723,705	5,007,599	21.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
H	723,715	5,007,566	23.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
I	723,724	5,007,532	25.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
J	723,731	5,007,502	26.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
K	723,708	5,007,057	58.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
L	722,428	5,012,058	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
M	723,650	5,007,287	35.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
N	722,830	5,010,790	32.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
O	723,905	5,007,805	23.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
P	722,575	5,009,383	27.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Q	722,462	5,011,996	52.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
R	722,479	5,012,010	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
S	722,492	5,012,024	51.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
T	722,505	5,012,036	51.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
U	722,519	5,012,047	50.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
V	722,535	5,012,061	50.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
W	722,551	5,012,071	50.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
X	722,573	5,012,090	50.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Y	722,570	5,012,118	52.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
Z	722,564	5,012,135	53.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AA	722,556	5,012,157	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AB	722,565	5,012,177	53.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AC	722,574	5,012,160	53.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AD	722,581	5,012,144	52.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AE	722,587	5,012,128	52.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AF	722,594	5,012,112	51.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AG	722,599	5,012,089	49.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AH	722,595	5,012,080	49.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AI	722,579	5,012,065	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AJ	722,567	5,012,054	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AK	722,550	5,012,040	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AL	722,535	5,012,027	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AM	722,520	5,012,015	50.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AN	722,505	5,012,004	51.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AO	722,492	5,011,992	51.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AP	722,486	5,011,987	51.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AQ	722,471	5,011,974	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AR	722,454	5,011,968	52.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AS	722,443	5,011,968	52.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AT	722,567	5,012,127	52.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AU	722,561	5,012,146	53.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AV	722,550	5,012,164	54.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AW	722,569	5,012,169	53.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AX	722,577	5,012,153	53.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AY	722,584	5,012,135	52.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
AZ	722,591	5,012,119	51.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BA	722,494	5,009,513	25.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BB	723,318	5,008,114	16.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BC	722,207	5,010,623	35.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BD	722,206	5,011,151	42.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BE	722,505	5,012,173	55.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BF	722,575	5,012,101	51.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BG	722,563	5,012,078	50.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BH	722,177	5,010,473	33.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BI	722,543	5,012,065	50.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BJ	722,189	5,010,508	33.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BK	722,118	5,010,514	36.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BL	722,583	5,009,338	26.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BM	723,278	5,008,693	13.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BN	722,126	5,010,473	35.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BO	722,306	5,010,883	38.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BP	722,159	5,011,181	45.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BQ	722,450	5,012,119	56.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BR	722,021	5,010,483	40.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BS	723,606	5,007,472	26.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BT	722,588	5,012,073	49.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BU	723,355	5,006,965	42.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BV	722,047	5,010,520	39.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BW	722,283	5,010,734	35.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BX	722,942	5,006,315	42.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BY	722,090	5,005,804	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
BZ	722,134	5,005,833	50.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CA	722,171	5,005,912	47.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CB	723,845	5,008,008	12.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CC	723,342	5,008,144	16.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CD	722,783	5,012,327	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CE	723,645	5,007,345	32.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CF	723,194	5,012,381	46.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CG	722,570	5,012,502	47.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CH	724,085	5,007,420	21.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CI	722,723	5,009,359	16.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
CJ	722,695	5,009,277	18.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CK	722,279	5,010,247	28.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CL	723,291	5,008,372	14.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CM	723,047	5,008,694	18.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CN	722,828	5,010,849	32.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CO	723,403	5,012,633	46.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CP	722,300	5,010,516	31.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CQ	722,785	5,012,282	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CR	722,415	5,005,967	46.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CS	722,747	5,012,558	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CT	722,381	5,005,957	46.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CU	723,185	5,007,880	21.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CV	722,542	5,006,060	43.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CW	723,123	5,008,422	22.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CX	723,110	5,008,482	23.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CY	723,206	5,008,079	19.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
CZ	722,189	5,009,721	28.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DA	722,015	5,011,242	51.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DB	722,203	5,010,951	41.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DC	722,438	5,011,850	47.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DD	722,597	5,012,103	50.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DE	723,107	5,008,636	19.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DF	722,884	5,008,878	6.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DG	724,203	5,007,832	11.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DH	722,301	5,010,464	30.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DI	723,519	5,007,254	33.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DJ	724,154	5,007,894	11.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DK	723,410	5,007,018	42.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DL	724,002	5,007,938	16.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DM	722,301	5,010,581	32.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DN	722,743	5,009,483	13.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DO	722,575	5,010,167	30.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DP	722,529	5,009,148	30.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DQ	723,228	5,007,713	9.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DR	722,153	5,005,809	49.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DS	723,103	5,012,382	48.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DT	723,139	5,012,416	48.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DU	722,271	5,010,220	27.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DV	722,270	5,010,077	26.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DW	722,387	5,010,086	26.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DX	722,473	5,010,119	28.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DY	722,713	5,012,567	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
DZ	722,723	5,012,591	49.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EA	722,721	5,012,509	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EB	722,252	5,009,832	25.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EC	723,467	5,007,373	26.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ED	722,235	5,011,805	53.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EE	721,580	5,011,258	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EF	721,544	5,011,295	60.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EG	723,728	5,007,393	30.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EH	723,264	5,006,883	38.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EI	723,250	5,006,850	39.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EJ	723,229	5,006,798	39.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EK	724,027	5,007,819	22.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EL	724,030	5,007,797	23.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EM	723,503	5,007,212	35.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EN	722,354	5,010,109	26.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EO	722,664	5,006,163	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EP	722,691	5,006,186	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EQ	723,189	5,007,815	17.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ER	722,520	5,009,206	31.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ES	722,688	5,009,046	23.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ET	723,660	5,007,623	18.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EU	722,714	5,009,017	21.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EV	721,993	5,011,587	55.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
EW	721,859	5,011,384	55.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EX	723,599	5,007,591	17.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EY	723,729	5,007,288	35.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
EZ	723,469	5,007,143	37.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FA	723,464	5,007,122	38.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FB	722,484	5,009,345	35.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FC	723,084	5,008,602	22.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FD	723,899	5,007,832	21.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FE	722,469	5,012,141	56.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FF	722,739	5,009,457	14.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FG	723,608	5,007,284	34.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FH	723,433	5,007,041	42.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FI	723,445	5,007,070	41.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FJ	723,446	5,007,221	33.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FK	723,180	5,006,603	42.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FL	723,447	5,007,264	31.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FM	723,934	5,007,822	22.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FN	723,396	5,007,400	21.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FO	722,480	5,009,554	22.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FP	722,521	5,009,543	23.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FQ	722,531	5,009,530	23.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FR	722,693	5,009,441	19.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FS	722,694	5,009,454	19.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FT	723,201	5,008,400	18.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FU	723,247	5,008,435	16.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FV	723,137	5,008,514	21.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FW	723,185	5,008,515	18.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FX	723,232	5,008,517	17.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FY	723,242	5,008,476	17.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
FZ	723,270	5,008,484	16.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GA	723,265	5,008,513	16.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GB	723,117	5,008,601	20.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GC	723,194	5,008,156	18.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GD	722,708	5,009,163	19.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GE	723,226	5,007,921	19.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GF	722,299	5,011,800	51.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GG	723,199	5,012,467	48.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GH	722,042	5,005,731	52.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GI	723,583	5,007,251	36.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GJ	723,350	5,006,793	53.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GK	722,117	5,010,716	44.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GL	723,164	5,006,479	47.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GM	723,188	5,006,498	49.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GN	722,600	5,009,483	24.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GO	721,758	5,011,362	56.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GP	721,745	5,011,338	57.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GQ	721,798	5,011,374	56.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GR	721,810	5,011,394	55.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GS	721,976	5,011,614	54.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GT	723,156	5,008,489	20.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GU	723,714	5,007,431	29.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GV	722,239	5,011,196	41.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GW	723,142	5,006,456	46.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GX	723,129	5,006,441	46.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GY	722,366	5,011,851	50.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
GZ	723,799	5,007,380	32.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HA	723,110	5,006,469	44.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HB	723,131	5,006,487	44.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HC	722,146	5,011,739	54.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HD	723,310	5,007,783	6.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HE	723,289	5,007,476	9.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HF	723,892	5,007,857	20.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HG	723,885	5,007,881	20.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HH	723,878	5,007,906	18.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HI	723,635	5,007,611	17.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"

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SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
HJ	722,626	5,012,264	52.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HK	722,547	5,012,208	54.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HL	723,337	5,008,078	15.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HM	722,201	5,010,890	40.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HN	722,201	5,010,825	39.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HO	721,993	5,011,178	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HP	723,687	5,007,549	23.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HQ	723,696	5,007,527	25.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HR	721,978	5,011,149	55.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HS	723,766	5,007,889	16.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HT	722,173	5,011,755	54.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HU	722,683	5,009,814	25.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HV	722,452	5,009,697	18.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HW	722,580	5,010,830	32.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HX	722,286	5,010,668	34.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HY	723,096	5,008,543	23.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
HZ	722,437	5,010,144	28.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IA	722,522	5,010,183	29.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IB	722,279	5,010,339	29.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IC	722,195	5,011,736	54.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ID	722,330	5,011,822	51.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IE	721,704	5,005,421	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IF	721,684	5,005,391	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IG	721,894	5,005,612	55.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IH	722,294	5,005,969	47.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
II	722,323	5,005,957	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IJ	722,230	5,005,862	47.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IK	722,267	5,005,882	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IL	722,311	5,005,912	47.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IM	722,356	5,005,943	47.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IN	722,363	5,005,986	46.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IO	722,423	5,006,025	44.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IP	722,473	5,006,052	43.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IQ	722,494	5,006,067	42.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IR	722,507	5,006,075	42.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IS	722,536	5,006,094	42.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IT	722,597	5,006,100	42.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IU	722,656	5,006,118	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IV	722,617	5,006,121	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IW	722,687	5,006,228	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IX	722,732	5,006,217	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IY	722,758	5,006,227	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
IZ	722,786	5,006,271	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JA	722,790	5,006,240	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JB	722,843	5,006,254	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JC	722,879	5,006,284	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JD	722,945	5,006,352	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JE	722,903	5,006,296	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JF	722,979	5,006,332	43.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JG	723,028	5,006,359	45.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JH	723,098	5,006,452	44.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JI	723,090	5,006,402	46.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JJ	723,152	5,006,516	44.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JK	723,249	5,006,608	49.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JL	723,185	5,006,647	41.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JM	723,216	5,006,755	40.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JN	723,200	5,006,715	40.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JO	723,239	5,006,729	43.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JP	723,331	5,006,872	47.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JQ	723,300	5,006,952	37.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JR	723,449	5,006,848	55.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JS	723,374	5,007,026	38.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JT	723,434	5,006,927	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JU	723,406	5,007,066	38.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JV	723,419	5,007,096	37.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
JW	723,457	5,007,089	40.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JX	723,435	5,007,151	35.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JY	723,641	5,007,669	14.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
JZ	723,700	5,007,635	20.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KA	723,865	5,007,576	28.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KB	723,441	5,007,178	34.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KC	723,442	5,007,290	29.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KD	723,684	5,007,379	30.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KE	723,685	5,007,783	12.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KF	723,763	5,007,584	24.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KG	723,772	5,007,554	26.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KH	723,779	5,007,528	27.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KI	723,786	5,007,491	28.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KJ	723,835	5,007,588	27.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KK	723,858	5,007,716	24.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KL	723,887	5,007,631	27.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KM	723,912	5,007,611	28.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KN	723,928	5,007,619	28.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KO	723,973	5,007,662	27.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KP	724,002	5,007,714	25.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KQ	723,915	5,007,682	26.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KR	723,965	5,007,745	25.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KS	723,945	5,007,789	24.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KT	723,927	5,007,726	26.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KU	723,926	5,007,853	21.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KV	723,918	5,007,772	24.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KW	723,922	5,007,943	17.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KX	723,878	5,008,025	13.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KY	723,855	5,007,946	16.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
KZ	723,918	5,008,088	11.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LA	723,952	5,008,134	8.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LB	723,963	5,008,203	4.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LC	723,423	5,007,367	24.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LD	723,363	5,007,426	18.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LE	723,322	5,007,455	13.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LF	723,200	5,007,667	7.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LG	723,187	5,007,718	11.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LH	723,212	5,007,768	14.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LI	723,172	5,007,773	16.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LJ	723,184	5,007,839	19.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LK	723,186	5,007,862	20.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LL	723,245	5,007,859	16.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LM	723,197	5,007,905	20.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LN	723,152	5,007,878	22.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LO	723,202	5,007,953	21.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LP	723,224	5,007,997	19.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LQ	723,176	5,008,002	22.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LR	723,240	5,008,072	18.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LS	723,192	5,008,173	18.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LT	723,408	5,008,162	12.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LU	723,306	5,008,210	16.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LV	723,123	5,008,206	21.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LW	723,165	5,008,273	18.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LX	723,317	5,008,326	13.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LY	723,159	5,008,312	19.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
LZ	723,076	5,008,308	26.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MA	723,277	5,008,435	14.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MB	723,164	5,008,424	20.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MC	723,142	5,008,387	21.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MD	723,235	5,008,601	16.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ME	723,069	5,008,793	14.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MF	723,246	5,008,634	15.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MG	723,120	5,008,712	15.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MH	723,273	5,008,778	12.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MI	723,031	5,008,777	15.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
MJ	722,979	5,008,790	15.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MK	722,800	5,008,938	16.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ML	722,818	5,008,969	12.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MM	722,794	5,008,999	15.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MN	722,752	5,008,978	20.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MO	722,750	5,009,031	18.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MP	722,735	5,009,045	19.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MQ	722,659	5,009,067	24.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MR	722,690	5,009,089	21.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MS	722,619	5,009,116	25.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MT	722,677	5,009,105	22.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MU	722,646	5,009,133	23.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MV	722,631	5,009,153	23.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MW	722,831	5,009,226	7.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MX	722,777	5,009,258	11.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MY	722,598	5,009,219	22.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
MZ	722,550	5,009,338	30.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NA	722,553	5,009,458	26.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NB	722,569	5,009,420	27.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NC	722,529	5,009,424	29.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ND	722,574	5,009,505	24.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NE	722,631	5,009,455	23.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NF	722,720	5,009,513	15.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NG	722,511	5,009,564	22.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NH	722,460	5,009,589	20.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NI	722,196	5,011,772	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NJ	724,036	5,007,840	21.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NK	721,689	5,005,457	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NL	721,651	5,005,419	60.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NM	723,621	5,007,332	32.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NN	723,162	5,007,801	18.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NO	723,178	5,007,751	14.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NP	723,943	5,007,574	29.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NQ	723,696	5,007,400	30.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NR	723,383	5,008,076	12.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NS	722,503	5,009,575	21.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NT	721,940	5,005,650	54.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NU	723,262	5,007,749	9.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NV	721,853	5,005,572	56.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NW	723,675	5,007,320	33.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NX	723,471	5,007,450	20.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NY	722,709	5,009,496	17.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
NZ	723,683	5,007,675	16.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OA	722,292	5,011,829	52.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OB	722,279	5,011,823	52.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OC	722,272	5,011,783	51.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OD	722,247	5,011,766	52.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OE	722,063	5,011,648	56.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OF	721,963	5,011,606	54.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OG	721,877	5,011,525	53.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OH	722,018	5,011,611	55.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OI	721,948	5,011,481	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OJ	721,783	5,011,343	57.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OK	721,773	5,011,306	58.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OL	721,732	5,011,317	58.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OM	722,262	5,011,812	53.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
ON	721,621	5,011,215	60.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OO	722,325	5,011,854	52.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OP	722,377	5,011,908	53.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OQ	722,409	5,011,986	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OR	722,406	5,012,041	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OS	722,527	5,012,193	55.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OT	722,571	5,012,226	54.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OU	722,611	5,012,217	52.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OV	722,606	5,012,253	53.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
OW	722,642	5,012,240	52.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OX	722,663	5,012,251	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OY	722,653	5,012,280	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
OZ	722,681	5,012,289	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PA	722,695	5,012,264	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PB	722,706	5,012,295	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PC	722,724	5,012,272	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PD	722,726	5,012,300	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PE	722,750	5,012,276	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PF	722,850	5,012,287	52.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PG	722,830	5,012,316	53.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PH	722,755	5,012,303	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PI	722,774	5,012,355	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PJ	722,806	5,012,357	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PK	722,795	5,012,382	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PL	722,766	5,012,383	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PM	722,757	5,012,419	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PN	722,788	5,012,413	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PO	722,781	5,012,439	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PP	722,750	5,012,438	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PQ	722,744	5,012,470	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PR	722,771	5,012,475	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PS	722,763	5,012,501	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PT	722,755	5,012,530	52.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PU	722,744	5,012,588	51.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PV	722,691	5,012,499	50.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PW	722,685	5,012,469	51.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PX	722,657	5,012,490	49.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PY	722,659	5,012,461	50.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
PZ	722,630	5,012,483	49.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QA	722,634	5,012,456	50.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QB	722,597	5,012,474	49.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QC	722,555	5,012,448	50.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QD	722,548	5,012,482	47.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QE	722,873	5,012,325	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QF	722,932	5,012,324	53.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QG	722,998	5,012,335	51.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QH	723,032	5,012,313	49.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QI	723,038	5,012,347	49.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QJ	723,067	5,012,360	49.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QK	723,105	5,012,346	48.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QL	723,136	5,012,371	48.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QM	723,174	5,012,446	48.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QN	723,224	5,012,489	48.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QO	723,225	5,012,451	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QP	723,245	5,012,508	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QQ	723,314	5,012,499	47.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QR	723,275	5,012,495	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QS	723,281	5,012,546	48.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QT	723,362	5,012,580	47.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QU	723,375	5,012,598	47.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QV	723,387	5,012,662	47.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QW	723,440	5,012,674	46.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QX	722,037	5,011,729	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QY	722,397	5,011,952	54.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
QZ	722,580	5,012,434	50.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RA	722,224	5,011,751	53.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RB	722,081	5,011,661	55.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RC	722,098	5,011,674	55.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RD	722,120	5,011,689	55.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RE	722,139	5,011,702	55.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RF	722,155	5,011,714	54.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RG	722,179	5,011,726	54.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RH	723,607	5,007,595	17.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RI	721,764	5,010,925	89.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
			[m]	[m]	[m]	[m]	[°]	[°]	
RJ	722,077	5,011,137	50.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RK	723,380	5,008,134	14.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RL	723,254	5,006,636	48.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RM	722,293	5,010,795	36.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RN	723,197	5,012,340	45.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RO	723,203	5,012,333	45.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RP	723,213	5,012,332	44.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RQ	723,177	5,012,376	47.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RR	723,230	5,012,340	44.6	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RS	723,239	5,012,346	44.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RT	723,248	5,012,358	44.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RU	723,247	5,012,369	45.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RV	723,231	5,012,360	45.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RW	723,245	5,012,378	45.7	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RX	723,239	5,012,386	46.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RY	723,183	5,012,368	46.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
RZ	723,199	5,012,369	46.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SA	723,206	5,012,358	46.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SB	723,194	5,012,350	46.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SC	723,545	5,007,695	4.8	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SD	723,570	5,007,643	10.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SE	723,370	5,012,591	47.1	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SF	723,138	5,012,348	47.5	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SG	722,706	5,006,186	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SH	722,717	5,006,205	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SI	722,748	5,006,277	42.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SJ	723,190	5,006,673	40.9	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SK	723,353	5,007,007	38.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SL	724,210	5,007,703	16.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SM	723,242	5,007,741	10.2	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SN	722,552	5,009,267	29.0	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SO	722,497	5,009,308	35.3	3.0	3.0	1.0	0.0	90.0	"Green house mode"
SP	721,473	5,011,206	65.4	3.0	3.0	1.0	0.0	90.0	"Green house mode"

Calculation Results

Shadow receptor

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
A	0:00	0	0:00
B	0:00	0	0:00
C	0:00	0	0:00
D	0:00	0	0:00
E	84:08	140	0:51
F	179:29	209	1:06
G	0:00	0	0:00
H	0:00	0	0:00
I	0:00	0	0:00
J	0:00	0	0:00
K	0:00	0	0:00
L	0:00	0	0:00
M	0:00	0	0:00
N	0:00	0	0:00
O	0:00	0	0:00
P	12:23	50	0:19
Q	0:00	0	0:00
R	0:00	0	0:00
S	0:00	0	0:00
T	0:00	0	0:00
U	0:00	0	0:00
V	0:00	0	0:00
W	0:00	0	0:00
X	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
Y	0:00	0	0:00
Z	0:00	0	0:00
AA	0:00	0	0:00
AB	0:00	0	0:00
AC	0:00	0	0:00
AD	0:00	0	0:00
AE	0:00	0	0:00
AF	0:00	0	0:00
AG	0:00	0	0:00
AH	0:00	0	0:00
AI	0:00	0	0:00
AJ	0:00	0	0:00
AK	0:00	0	0:00
AL	0:00	0	0:00
AM	0:00	0	0:00
AN	0:00	0	0:00
AO	0:00	0	0:00
AP	0:00	0	0:00
AQ	0:00	0	0:00
AR	0:00	0	0:00
AS	0:00	0	0:00
AT	0:00	0	0:00
AU	0:00	0	0:00
AV	0:00	0	0:00
AW	0:00	0	0:00
AX	0:00	0	0:00
AY	0:00	0	0:00
AZ	0:00	0	0:00
BA	13:14	51	0:20
BB	0:00	0	0:00
BC	17:02	58	0:20
BD	0:00	0	0:00
BE	0:00	0	0:00
BF	0:00	0	0:00
BG	0:00	0	0:00
BH	13:21	50	0:21
BI	0:00	0	0:00
BJ	14:26	56	0:21
BK	19:46	68	0:22
BL	12:19	51	0:19
BM	0:00	0	0:00
BN	16:22	63	0:21
BO	0:00	0	0:00
BP	0:00	0	0:00
BQ	0:00	0	0:00
BR	20:51	62	0:23
BS	0:00	0	0:00
BT	0:00	0	0:00
BU	0:00	0	0:00
BV	19:17	58	0:22
BW	0:00	0	0:00
BX	0:00	0	0:00
BY	15:03	56	0:20
BZ	0:00	0	0:00
CA	0:00	0	0:00
CB	0:00	0	0:00
CC	0:00	0	0:00
CD	0:00	0	0:00
CE	0:00	0	0:00
CF	0:00	0	0:00
CG	0:00	0	0:00
CH	0:00	0	0:00
CI	0:00	0	0:00
CJ	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
CK	8:36	32	0:21
CL	0:00	0	0:00
CM	0:00	0	0:00
CN	0:00	0	0:00
CO	0:00	0	0:00
CP	10:12	41	0:19
CQ	0:00	0	0:00
CR	0:00	0	0:00
CS	0:00	0	0:00
CT	0:00	0	0:00
CU	0:00	0	0:00
CV	0:00	0	0:00
CW	0:00	0	0:00
CX	0:00	0	0:00
CY	0:00	0	0:00
CZ	20:42	71	0:24
DA	0:00	0	0:00
DB	0:00	0	0:00
DC	0:00	0	0:00
DD	0:00	0	0:00
DE	0:00	0	0:00
DF	0:00	0	0:00
DG	0:00	0	0:00
DH	9:36	38	0:20
DI	0:00	0	0:00
DJ	0:00	0	0:00
DK	0:00	0	0:00
DL	0:00	0	0:00
DM	0:00	0	0:00
DN	0:00	0	0:00
DO	0:00	0	0:00
DP	13:50	55	0:20
DQ	0:00	0	0:00
DR	0:00	0	0:00
DS	0:00	0	0:00
DT	0:00	0	0:00
DU	8:34	31	0:21
DV	8:16	29	0:22
DW	7:11	27	0:20
DX	6:26	26	0:19
DY	0:00	0	0:00
DZ	0:00	0	0:00
EA	0:00	0	0:00
EB	19:52	71	0:23
EC	0:00	0	0:00
ED	0:00	0	0:00
EE	0:00	0	0:00
EF	0:00	0	0:00
EG	0:00	0	0:00
EH	0:00	0	0:00
EI	0:00	0	0:00
EJ	0:00	0	0:00
EK	0:00	0	0:00
EL	0:00	0	0:00
EM	0:00	0	0:00
EN	7:24	28	0:20
EO	0:00	0	0:00
EP	0:00	0	0:00
EQ	0:00	0	0:00
ER	13:50	54	0:20
ES	0:00	0	0:00
ET	0:00	0	0:00
EU	0:00	0	0:00
EV	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
EW	0:00	0	0:00
EX	0:00	0	0:00
EY	0:00	0	0:00
EZ	0:00	0	0:00
FA	0:00	0	0:00
FB	13:52	54	0:21
FC	0:00	0	0:00
FD	0:00	0	0:00
FE	0:00	0	0:00
FF	0:00	0	0:00
FG	0:00	0	0:00
FH	0:00	0	0:00
FI	0:00	0	0:00
FJ	0:00	0	0:00
FK	0:00	0	0:00
FL	0:00	0	0:00
FM	0:00	0	0:00
FN	0:00	0	0:00
FO	13:26	53	0:20
FP	12:44	50	0:20
FQ	12:40	50	0:20
FR	0:00	0	0:00
FS	0:00	0	0:00
FT	0:00	0	0:00
FU	0:00	0	0:00
FV	0:00	0	0:00
FW	0:00	0	0:00
FX	0:00	0	0:00
FY	0:00	0	0:00
FZ	0:00	0	0:00
GA	0:00	0	0:00
GB	0:00	0	0:00
GC	0:00	0	0:00
GD	0:00	0	0:00
GE	0:00	0	0:00
GF	0:00	0	0:00
GG	0:00	0	0:00
GH	4:10	31	0:11
GI	0:00	0	0:00
GJ	0:00	0	0:00
GK	5:00	26	0:14
GL	0:00	0	0:00
GM	0:00	0	0:00
GN	6:00	26	0:19
GO	0:00	0	0:00
GP	0:00	0	0:00
GQ	0:00	0	0:00
GR	0:00	0	0:00
GS	0:00	0	0:00
GT	0:00	0	0:00
GU	0:00	0	0:00
GV	0:00	0	0:00
GW	0:00	0	0:00
GX	0:00	0	0:00
GY	0:00	0	0:00
GZ	0:00	0	0:00
HA	0:00	0	0:00
HB	0:00	0	0:00
HC	0:00	0	0:00
HD	0:00	0	0:00
HE	0:00	0	0:00
HF	0:00	0	0:00
HG	0:00	0	0:00
HH	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
HI	0:00	0	0:00
HJ	0:00	0	0:00
HK	0:00	0	0:00
HL	0:00	0	0:00
HM	0:00	0	0:00
HN	0:00	0	0:00
HO	0:00	0	0:00
HP	0:00	0	0:00
HQ	0:00	0	0:00
HR	0:00	0	0:00
HS	0:00	0	0:00
HT	0:00	0	0:00
HU	0:00	0	0:00
HV	13:56	54	0:20
HW	0:00	0	0:00
HX	0:00	0	0:00
HY	0:00	0	0:00
HZ	6:42	27	0:20
IA	0:00	0	0:00
IB	9:02	34	0:20
IC	0:00	0	0:00
ID	0:00	0	0:00
IE	16:21	65	0:23
IF	17:33	70	0:23
IG	5:34	26	0:19
IH	0:00	0	0:00
II	0:00	0	0:00
IJ	0:00	0	0:00
IK	0:00	0	0:00
IL	0:00	0	0:00
IM	0:00	0	0:00
IN	0:00	0	0:00
IO	0:00	0	0:00
IP	0:00	0	0:00
IQ	0:00	0	0:00
IR	0:00	0	0:00
IS	0:00	0	0:00
IT	0:00	0	0:00
IU	0:00	0	0:00
IV	0:00	0	0:00
IW	0:00	0	0:00
IX	0:00	0	0:00
IY	0:00	0	0:00
IZ	0:00	0	0:00
JA	0:00	0	0:00
JB	0:00	0	0:00
JC	0:00	0	0:00
JD	0:00	0	0:00
JE	0:00	0	0:00
JF	0:00	0	0:00
JG	0:00	0	0:00
JH	0:00	0	0:00
JI	0:00	0	0:00
JJ	0:00	0	0:00
JK	0:00	0	0:00
JL	0:00	0	0:00
JM	0:00	0	0:00
JN	0:00	0	0:00
JO	0:00	0	0:00
JP	0:00	0	0:00
JQ	0:00	0	0:00
JR	0:00	0	0:00
JS	0:00	0	0:00
JT	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
JU	0:00	0	0:00
JV	0:00	0	0:00
JW	0:00	0	0:00
JX	0:00	0	0:00
JY	0:00	0	0:00
JZ	0:00	0	0:00
KA	0:00	0	0:00
KB	0:00	0	0:00
KC	0:00	0	0:00
KD	0:00	0	0:00
KE	0:00	0	0:00
KF	0:00	0	0:00
KG	0:00	0	0:00
KH	0:00	0	0:00
KI	0:00	0	0:00
KJ	0:00	0	0:00
KK	0:00	0	0:00
KL	0:00	0	0:00
KM	0:00	0	0:00
KN	0:00	0	0:00
KO	0:00	0	0:00
KP	0:00	0	0:00
KQ	0:00	0	0:00
KR	0:00	0	0:00
KS	0:00	0	0:00
KT	0:00	0	0:00
KU	0:00	0	0:00
KV	0:00	0	0:00
KW	0:00	0	0:00
KX	0:00	0	0:00
KY	0:00	0	0:00
KZ	0:00	0	0:00
LA	0:00	0	0:00
LB	0:00	0	0:00
LC	0:00	0	0:00
LD	0:00	0	0:00
LE	0:00	0	0:00
LF	0:00	0	0:00
LG	0:00	0	0:00
LH	0:00	0	0:00
LI	0:00	0	0:00
LJ	0:00	0	0:00
LK	0:00	0	0:00
LL	0:00	0	0:00
LM	0:00	0	0:00
LN	0:00	0	0:00
LO	0:00	0	0:00
LP	0:00	0	0:00
LQ	0:00	0	0:00
LR	0:00	0	0:00
LS	0:00	0	0:00
LT	0:00	0	0:00
LU	0:00	0	0:00
LV	0:00	0	0:00
LW	0:00	0	0:00
LX	0:00	0	0:00
LY	0:00	0	0:00
LZ	0:00	0	0:00
MA	0:00	0	0:00
MB	0:00	0	0:00
MC	0:00	0	0:00
MD	0:00	0	0:00
ME	0:00	0	0:00
MF	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
MG	0:00	0	0:00
MH	0:00	0	0:00
MI	0:00	0	0:00
MJ	0:00	0	0:00
MK	0:00	0	0:00
ML	0:00	0	0:00
MM	0:00	0	0:00
MN	0:00	0	0:00
MO	0:00	0	0:00
MP	0:00	0	0:00
MQ	5:35	23	0:18
MR	0:00	0	0:00
MS	12:40	52	0:19
MT	0:00	0	0:00
MU	12:05	50	0:19
MV	12:12	50	0:19
MW	0:00	0	0:00
MX	0:00	0	0:00
MY	12:29	51	0:19
MZ	12:50	50	0:20
NA	12:21	49	0:20
NB	12:19	51	0:20
NC	12:55	51	0:20
ND	6:08	24	0:19
NE	5:55	24	0:19
NF	0:00	0	0:00
NG	12:58	52	0:20
NH	13:45	53	0:21
NI	0:00	0	0:00
NJ	0:00	0	0:00
NK	16:25	64	0:23
NL	18:14	70	0:24
NM	0:00	0	0:00
NN	0:00	0	0:00
NO	0:00	0	0:00
NP	0:00	0	0:00
NQ	0:00	0	0:00
NR	0:00	0	0:00
NS	13:05	53	0:20
NT	5:08	24	0:18
NU	0:00	0	0:00
NV	5:57	27	0:20
NW	0:00	0	0:00
NX	0:00	0	0:00
NY	0:00	0	0:00
NZ	0:00	0	0:00
OA	0:00	0	0:00
OB	0:00	0	0:00
OC	0:00	0	0:00
OD	0:00	0	0:00
OE	0:00	0	0:00
OF	0:00	0	0:00
OG	0:00	0	0:00
OH	0:00	0	0:00
OI	0:00	0	0:00
OJ	0:00	0	0:00
OK	0:00	0	0:00
OL	0:00	0	0:00
OM	0:00	0	0:00
ON	0:00	0	0:00
OO	0:00	0	0:00
OP	0:00	0	0:00
OQ	0:00	0	0:00
OR	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
OS	0:00	0	0:00
OT	0:00	0	0:00
OU	0:00	0	0:00
OV	0:00	0	0:00
OW	0:00	0	0:00
OX	0:00	0	0:00
OY	0:00	0	0:00
OZ	0:00	0	0:00
PA	0:00	0	0:00
PB	0:00	0	0:00
PC	0:00	0	0:00
PD	0:00	0	0:00
PE	0:00	0	0:00
PF	0:00	0	0:00
PG	0:00	0	0:00
PH	0:00	0	0:00
PI	0:00	0	0:00
PJ	0:00	0	0:00
PK	0:00	0	0:00
PL	0:00	0	0:00
PM	0:00	0	0:00
PN	0:00	0	0:00
PO	0:00	0	0:00
PP	0:00	0	0:00
PQ	0:00	0	0:00
PR	0:00	0	0:00
PS	0:00	0	0:00
PT	0:00	0	0:00
PU	0:00	0	0:00
PV	0:00	0	0:00
PW	0:00	0	0:00
PX	0:00	0	0:00
PY	0:00	0	0:00
PZ	0:00	0	0:00
QA	0:00	0	0:00
QB	0:00	0	0:00
QC	0:00	0	0:00
QD	0:00	0	0:00
QE	0:00	0	0:00
QF	0:00	0	0:00
QG	0:00	0	0:00
QH	0:00	0	0:00
QI	0:00	0	0:00
QJ	0:00	0	0:00
QK	0:00	0	0:00
QL	0:00	0	0:00
QM	0:00	0	0:00
QN	0:00	0	0:00
QO	0:00	0	0:00
QP	0:00	0	0:00
QQ	0:00	0	0:00
QR	0:00	0	0:00
QS	0:00	0	0:00
QT	0:00	0	0:00
QU	0:00	0	0:00
QV	0:00	0	0:00
QW	0:00	0	0:00
QX	0:00	0	0:00
QY	0:00	0	0:00
QZ	0:00	0	0:00
RA	0:00	0	0:00
RB	0:00	0	0:00
RC	0:00	0	0:00
RD	0:00	0	0:00

To be continued on next page...

SHADOW - Main Result

Calculation: Shadow: Worst Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

...continued from previous page

Shadow, worst case

No.	Shadow hours per year [h/year]	Shadow days per year [days/year]	Max shadow hours per day [h/day]
RE	0:00	0	0:00
RF	0:00	0	0:00
RG	0:00	0	0:00
RH	0:00	0	0:00
RI	0:00	0	0:00
RJ	0:00	0	0:00
RK	0:00	0	0:00
RL	0:00	0	0:00
RM	0:00	0	0:00
RN	0:00	0	0:00
RO	0:00	0	0:00
RP	0:00	0	0:00
RQ	0:00	0	0:00
RR	0:00	0	0:00
RS	0:00	0	0:00
RT	0:00	0	0:00
RU	0:00	0	0:00
RV	0:00	0	0:00
RW	0:00	0	0:00
RX	0:00	0	0:00
RY	0:00	0	0:00
RZ	0:00	0	0:00
SA	0:00	0	0:00
SB	0:00	0	0:00
SC	0:00	0	0:00
SD	0:00	0	0:00
SE	0:00	0	0:00
SF	0:00	0	0:00
SG	0:00	0	0:00
SH	0:00	0	0:00
SI	0:00	0	0:00
SJ	0:00	0	0:00
SK	0:00	0	0:00
SL	0:00	0	0:00
SM	0:00	0	0:00
SN	13:03	53	0:20
SO	13:32	52	0:20
SP	0:00	0	0:00

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

No.	Name	Worst case [h/year]
1	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (1)	0:00
2	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (2)	16:39
3	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (3)	14:01
4	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (4)	15:44
5	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (5)	0:00
6	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (6)	0:00
7	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (7)	0:00
8	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (8)	0:00
9	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (9)	123:09
10	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (10)	276:38

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

APPENDIX C:

WindPRO v3.1, Shadow Module Calculation Results
Worst Case

SHADOW - Main Result

Calculation: Shadow: Realistic Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

Assumptions for shadow calculations

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

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

Sunshine probability S (Average daily sunshine hours) []
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
3.42 4.35 4.90 5.30 6.50 6.67 7.22 6.67 5.53 4.80 3.13 3.22

Operational time
0 Sum
8,337 8,337
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: Height Contours: CONTOURLINE_Birchill August 2018_19.wpo (1
Obstacles used in calculation
Eye height: 1.5 m
Grid resolution: 10.0 m

All coordinates are in
UTM (north)-NAD83 (US+CA) Zone: 19



Scale 1:75,000
New WTG Shadow receptor

WTGs

Easting	Northing	Z	Row data/Description	WTG type			Shadow data				
				Valid	Manufact.	Type-generator	Power, rated [kW]	Rotor diameter [m]	Hub height [m]	Calculation distance [m]	RPM
1	719,709	5,005,535	64.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
2	720,289	5,005,088	53.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
3	720,016	5,005,984	77.3 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
4	720,470	5,006,608	68.4 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
5	720,839	5,007,111	61.6 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
6	720,981	5,007,866	52.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
7	719,557	5,007,215	54.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
8	719,859	5,008,188	58.0 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
9	720,873	5,008,786	62.9 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6
10	720,849	5,009,426	65.8 ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TO... Yes	Yes	ENERCON	E-141 EP4-4,200	4,200	141.0	135.0	1,835	10.6

Shadow receptor-Input

No.	Easting	Northing	Z	Width	Height	Height a.g.l.	Degrees from south cw	Slope of window	Direction mode
	[m]	[m]	[m]	[m]	[m]	[m]	[°]	[°]	
A	721,483	5,009,479	49.8	3.0	1.0	1.0	12.0	90.0	Fixed direction
B	721,351	5,009,324	56.9	1.0	1.0	5.5	32.0	90.0	Fixed direction
C	721,587	5,009,383	48.9	3.0	1.0	4.0	12.0	90.0	Fixed direction
D	721,690	5,009,286	45.8	3.0	1.0	1.0	102.0	90.0	Fixed direction
E	721,794	5,009,190	39.6	3.0	1.0	4.0	102.0	90.0	Fixed direction
F	721,455	5,009,227	61.3	1.0	1.0	1.0	32.0	90.0	Fixed direction
G	721,559	5,009,131	57.1	1.0	1.0	1.0	122.0	90.0	Fixed direction
H	721,662	5,009,035	45.0	1.0	1.0	5.5	122.0	90.0	Fixed direction

Project:

Burchill_10_Turbine_2020

Licensed user:

Natural Forces Wind Inc
1801 Hollis Street, Suite 1205
CA-HALIFAX, Nova Scotia B3J 3N4
902 422 9663
Meg / mmorris@naturalforges.ca
Calculated:
2020-02-04 3:50 PM/3.1.633

SHADOW - Main Result

Calculation: Shadow: Realistic Case - Burchill 10Tc - E-141 (4.2 MW, 135 m HH)

Calculation Results

Shadow receptor

Shadow, expected values

No. Shadow hours

	per year [h/year]
A	12:15
B	27:29
C	9:37
D	7:07
E	6:15
F	19:52
G	12:42
H	6:37

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

No.	Name	Worst case [h/year]	Expected [h/year]
1	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (1)	0:00	0:00
2	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (2)	0:00	0:00
3	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (3)	0:00	0:00
4	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (4)	0:00	0:00
5	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (5)	0:00	0:00
6	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (6)	0:00	0:00
7	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (7)	0:00	0:00
8	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (8)	0:00	0:00
9	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (9)	179:16	37:23
10	ENERCON E-141 EP4 4200 141.0 !-! hub: 135.0 m (TOT: 205.5 m) (10)	230:00	20:50

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