Shadow Flicker Impact Analysis for the Baldwin Wind Energy Center

Prepared for

Baldwin Wind, LLC

Prepared by

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160 Federal Street
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May 2010

complex world

CLEAR SOLUTIONS™

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1.0 OVERVIEW

A wind turbine's moving blades can cast a moving shadow on locations within a certain distance of a turbine. These moving shadows are called shadow flicker, and can be a temporary phenomena experienced by people at nearby residences or public gathering places. The impact area depends on the time of year and day (which determines the sun's azimuth and altitude angles) and the wind turbine's physical characteristics (height, rotor diameter, blade width, and orientation of the rotor blades). Shadow flicker generally occurs during low angle sunlight conditions, typically during sunrise and sunset times of the day. However, when the sun angle gets very low (less than 3 degrees), the light has to pass through more atmosphere and becomes too diffused to form a coherent shadow. Shadow flicker will not occur when the sun is obscured by clouds or fog, at night, or when the source turbine(s) are not operating.

Shadow flicker intensity is defined as the difference in brightness at a given location in the presence and absence of a shadow. Shadow flicker intensity diminishes with greater receptor-to-turbine separation distance. Shadow flicker intensity for receptor-to-turbine distances beyond 1,500 meters is very low and generally considered imperceptible. Shadow flicker intensity for receptor-to-turbine distances between 1,000 and 1,500 meters (between 3,281 and 4,921 feet) is also low and considered barely noticeable. At this distance shadow flicker intensity would only tend to be noticed under conditions that would enhance the intensity difference, such as observing from a dark room with a single window directly facing the turbine casting the shadow. At distances less than 1,000 meters (3,281 feet), shadow flicker may be more noticeable. In general, the largest number of shadow flicker hours, along with greatest shadow flicker intensity, occurs nearest the wind turbines.

Baldwin Wind, LLC is proposing to install 64 wind turbines as part of the Baldwin Wind Energy Center (Project) in Burleigh County, North Dakota. Since the Project is using a minimum turbine siting setback requirement of 1,400 feet (to any residence), sensitive receptors (occupied residences) are generally not located in the worst case potential shadow flicker impact zones, which ensures that shadow flicker impacts are minimized. In Crofte Township, turbines must be at least 1,750 feet from non-participating residences.

The wind turbine being considered for the Project, and evaluated for potential shadow flicker impacts, has the following characteristics:

- **GE Wind Energy GE xle** – 3-blade 82.5-meter-diameter rotor, with a hub height of 80 meters. The GE xle has a nominal rotor speed of 18 rpm which translates to a blade pass frequency of 0.9 Hz (less than 1 alternation per second).

Shadow flicker frequency is related to the wind turbine's rotor blade speed and the number of blades on the rotor. From a health standpoint, such low frequencies are harmless. For comparison, strobe lights used in discotheques have frequencies which range from about 3 Hertz (Hz) to 10 Hz (1 Hz = 1 flash per second). As a result, public concerns that flickering light

from wind turbines can have negative health effects, such as triggering seizures in people with epilepsy are unfounded. The Epilepsy Action (working name for the British Epilepsy Foundation), states that there is no evidence that wind turbines can cause seizures (Epilepsy Action 2008). However, they recommend that wind turbine flicker frequency be limited to 3 Hz. Since the proposed Project's wind turbine blade pass frequency is approximately 0.9 Hz (less than 1 alternation per second), no negative health effects to individuals with photosensitive epilepsy are anticipated.

Shadow flicker impacts are not regulated in applicable state or federal law, and there is no permitting trigger with regard to hours per year of anticipated impacts to a receptor from a wind energy project. Due to the significant growth of the wind energy industry in recent years, some states have published model bylaws for local governments to adopt or modify at their own discretion which sometimes includes guidance and recommendations for shadow flicker levels and mitigation. However, a general precedent has been established in the industry both abroad and in the United States that fewer than 30 hours per year of shadow flicker impacts is acceptable to receptors in terms of nuisance and well below health hazard thresholds. In German court case for example, a judge found 30 hours of actual shadow flicker per year at a certain neighbor's property to be tolerable (WindPower 2003).

2.0 WINDPRO SHADOW FLICKER ANALYSIS

An analysis of potential shadow flicker impacts from the Project was conducted using the WindPro software package. The turbine array dated April 30, 2010, which includes 64 turbines and 44 alternate locations, was included in the analysis. The analysis evaluated the following two turbine scenarios:

- Scenario A – 108 turbines (primary and alternates locations)
- Scenario B – 64 turbines (primary locations only)

In addition to the proposed Project turbines, there are existing turbines from the Wilton I and II Wind Energy Centers that are located in the central portion of the Baldwin Project Area. These existing turbines have also been taken into account in the shadow flicker analysis.

The WindPro analysis was conducted to determine shadow flicker impacts under realistic impact conditions (actual expected shadow). This analysis calculated the total amount of time (hours and minutes per year) that shadow flicker could occur at receptors out to 1,500 meters (4,921.3 feet). The realistic impact condition scenario is based on the following assumptions:

- The elevation and position geometries of the wind turbines and surrounding receptors (houses). Elevations were determined using USGS digital elevation model (DEM) data. Positions geometries were determined using GIS and referenced to UTM Zone 14 (NAD83).

- The position of the sun and the incident sunlight relative to the wind turbine and receptors on a minute-by-minute basis over the course of a year.
- Historical sunshine hours availability (percent of total available). Historical sunshine rates for the area (as summarized by the National Climatic Data Center (NCDC, 2008) for nearby Bismarck, ND) used in this analysis are as follows:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
53%	53%	58%	58%	61%	64%	73%	72%	65%	58%	43%	47%

- Estimated wind turbine operations and orientation (based on approximately 16.5 years of wind data from 1/1/93 to 6/21/09 (wind speed / wind direction frequency distribution) measured at meteorological tower approximately 57 miles east of the proposed project site). The WindPro calculated wind direction frequency distribution for operating hour winds is as follows:

N	NNE	ENE	E	ESE	SSE	S	SSW	WSW	W	WNW	NNW
7.1%	4.9%	5.4%	7.0%	9.1%	10.1%	8.3%	5.6%	6.3%	10.0%	13.8%	12.4%

- Receptor viewpoints (i.e., house windows) are assumed to always be directly facing turbine to sun line of sight ("greenhouse mode").

WindPro incorporates terrain elevation contour information and the analysis accounts for terrain elevation differences. The sun's path with respect to each turbine location is calculated by the software to determine the cast shadow paths every minute over a full year. Sun angles less than 3 degrees above the horizon were excluded, for the reasons identified earlier in this section.

A total of 134 sensitive receptor locations were identified within one mile of the Project Area. These receptors are based on the April 22, 2010 Farmstead Report, and supplementary input from the client based on local knowledge. These locations correspond to houses or other structures in the Project Area. In addition, non-residential receptors (such as a church, cemetery, and abandoned farm yards) were considered. A receptor in the model is defined as a 1 m^2 area (approximate size of a typical window), 1 meter (3.28 feet) aboveground level. Approximate eye level is set at 1.5 meters (4.94 feet). Figure 1 shows the sensitive receptor locations considered.

3.0 WINDPRO SHADOW FLICKER ANALYSIS RESULTS

WindPro predicts that shadow flicker impacts will primarily occur near the wind turbines. Figures 2A and 2B describe the WindPro predicted expected shadow flicker impact areas for turbine scenarios A and B, respectively. A detailed WindPro shadow flicker analysis results summary, for each of the modeling receptor locations, is provided in Attachment A. Tables 1A and 1B present the WindPro predicted expected shadow flicker impacts for the top ten worst case receptors for turbine scenarios A and B, respectively. For scenario A, only 7 of the 134 receptors modeled had expected shadow flicker impacts predicted for more than 30 hours per

year. For scenario B, only 3 of the 134 receptors modeled had expected shadow flicker impacts predicted for more than 30 hours per year.

Only four of the top ten impact receptors are actively occupied residential structures for both turbine scenarios A and B. The maximum predicted shadow flicker impact at any active residential receptor (#40039) is 43 hours, 43 minutes per year, which is approximately 1.0 percent of the potential available daylight hours.

Table 1A. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts - Turbine Scenario A (with Alternates)

Receptor ID*	Receptor Description / Status	Shadow Hours per Year (expected) [hh:mm / year]
2027	Unoccupied	85:21
40039	Occupied	43:43
60010a	Unoccupied	37:31
60062	Occupied	35:29
60005	Non-Residential	34:15
40074a	Non-Residential	32:34
40066	Occupied	30:27
2018	Occupied	29:57
40070a	Unoccupied	28:42
40125a	Non-Residential	27:35

Table 1B. WindPro Predicted Shadow Flicker Impacts for Receptors with Maximum Expected Impacts - Turbine Scenario B (No Alternates)

Receptor ID*	Receptor Description / Status	Shadow Hours per Year (expected) [hh:mm / year]
2027	Unoccupied	84:43
40074a	Non-Residential	32:34
40039	Occupied	32:15
2018	Occupied	29:57
40066	Occupied	28:01
2050	Occupied	27:32
2025a	Unoccupied	26:26
41014a	Non-Residential	26:15
41013a	Non-Residential	25:46
2063	Occupied	22:59

Approximately 94.8 percent, or 127 of the 134 receptor locations evaluated (for turbine scenario A), have less than 30 hours per year of predicted shadow flicker impact. The shadow flicker impact prediction statistics are as summarized in Table 2.

Table 2A. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Sensitive Receptor Locations (Turbine Scenario A)

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	134
= 0 Hours	59
> 0 Hours < 10 hours	35
≥ 10 Hours < 20 hours	20
≥ 20 Hours < 30 hours	13
≥ 30 Hours < 40 hours	5
≥ 40 hours < 50 hours	1
≥ 50 hours	1

Table 2B. Statistical Summary of WindPro Predicted Shadow Flicker Impacts at Modeled Sensitive Receptor Locations (Turbine Scenario B)

Cumulative Shadow Flicker Time (expected)	Number of Receptors
Total	134
= 0 Hours	80
> 0 Hours < 10 hours	22
≥ 10 Hours < 20 hours	19
≥ 20 Hours < 30 hours	10
≥ 30 Hours < 40 hours	2
≥ 40 hours < 50 hours	0
≥ 50 hours	1

4.0 CONCLUSION

The analysis of potential shadow flicker impacts from the Project on nearby houses (receptors) shows that shadow flicker impacts within the area of study are expected to be minor. The analysis assumes that the houses all have a direct in line view of the incoming shadow flicker sunlight and does not account for trees or other obstructions which may block sunlight. In reality, the windows of many houses will not face the sun directly for the key shadow flicker impact times. In addition, potential shadow flicker impacts for wind turbines up to 1,500 meters (4,921 feet) away were determined. In reality, the shadow flicker impacts for turbines beyond 1,000 meters (3,281 feet) will be very low intensity. For these reasons, shadow flicker impacts are expected to be less than estimated with the conservative analysis, and shadow flicker is not expected to be a significant environmental impact.

Finally, there is no state or federal regulatory threshold for shadow flicker hours per year at a given receptor; therefore, the Project in no way violates state or federal permitting requirements or conditions according to the results of this shadow flicker impact analysis.

5.0 REFERENCES

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FIGURE 1
SENSITIVE RECEPTORS MODELED WITH WINDPRO TO PREDICT EXPECTED SHADOW FLICKER IMPACTS

MAY 2010

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Legend

- Wilton I Turbine Location
- Wilton II Turbine Location

Baldwin Turbine Location (4-30-2010 layout)

- Planned
- Alternate

Receptor (based on 4-22-2010 Farmstead Report)

- Occupied
- Unoccupied
- Non-Residential

N

W E

S

0 0.5 1 2 Miles

REFERENCE MAP

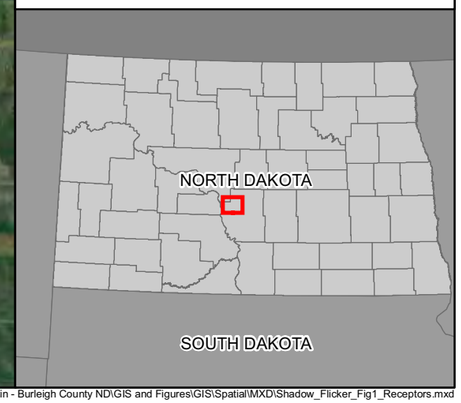

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FIGURE 2A
WINDPRO PREDICTED EXPECTED SHADOW FLICKER IMPACT AREAS
TURBINE SCENARIO A
(WITH ALTERNATES)

MAY 2010

TETRA TECH EC, INC.

Legend

- Wilton I Turbine Location
- Wilton II Turbine Location

Baldwin Turbine Location (4-30-2010 layout)

- Planned
- Alternate

Receptor (based on 4-22-2010 Farmstead Report)

- Occupied
- Unoccupied
- Non-Residential

Shadow Flicker Iso Line

- 10 hrs/yr
- 25 hrs/yr
- 50 hrs/yr
- 100 hrs/yr
- 200 hrs/yr

N
W E
S

0 0.5 1 2 Miles

REFERENCE MAP

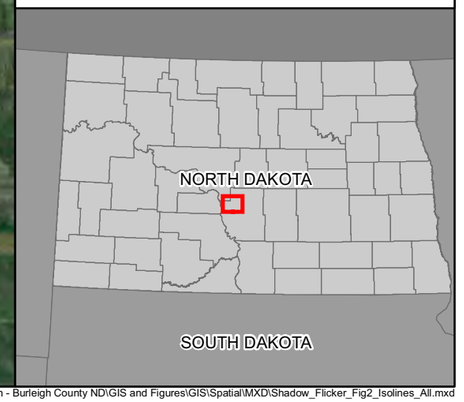

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FIGURE 2B
WINDPRO PREDICTED EXPECTED SHADOW FLICKER IMPACT AREAS
TURBINE SCENARIO B
(NO ALTERNATES)

MAY 2010

TETRA TECH EC, INC.

Legend

- Wilton I Turbine Location
- Wilton II Turbine Location

Baldwin Turbine Location (4-30-2010 layout)

- Planned

Receptor (based on 4-22-2010 Farmstead Report)

- Occupied
- Unoccupied
- Non-Residential

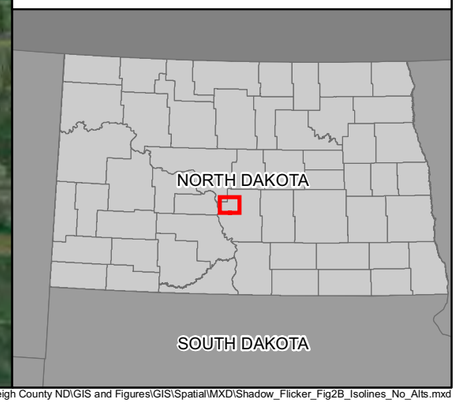
Shadow Flicker Iso Line

- 10 hrs/yr
- 25 hrs/yr
- 50 hrs/yr
- 100 hrs/yr
- 200 hrs/yr

N
W E
S

0 0.5 1 2 Miles

REFERENCE MAP



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ATTACHMENT A

Detailed Summary of WindPro Shadow Flicker Analysis Results

Baldwin Wind Energy Center
WindPro Shadow Flicker Analysis Results Summary
Turbine Scenario A (with Alternates)

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
2027	369,737	5,218,420	85:21:00	Unoccupied
40039	373,837	5,227,612	43:43:00	Occupied
60010a	372,900	5,213,255	37:31:00	Unoccupied
60062	375,973	5,210,859	35:29:00	Occupied
60005	372,824	5,212,708	34:15:00	Non-Residential
40074a	370,668	5,225,623	32:34:00	Non-Residential
40066	372,315	5,225,695	30:27:00	Occupied
2018	368,373	5,219,341	29:57:00	Occupied
40070a	372,259	5,227,439	28:42:00	Unoccupied
40125a	372,393	5,227,947	27:35:00	Non-Residential
2050	368,883	5,216,631	27:32:00	Occupied
2025a	370,431	5,218,318	26:26:00	Unoccupied
41014a	368,950	5,226,845	26:15:00	Non-Residential
41013a	368,951	5,226,825	25:46:00	Non-Residential
2063	372,584	5,220,687	22:59:00	Occupied
40063a	372,312	5,224,843	22:47:00	Unoccupied
2020	369,311	5,219,083	21:09:00	Occupied
6100a	372,687	5,220,626	21:09:00	Occupied
2028	371,097	5,217,187	20:54:00	Occupied
40069	372,228	5,226,802	20:11:00	Unoccupied
2024	369,232	5,219,059	19:35:00	Occupied
60058	376,209	5,210,903	19:35:00	Occupied
2019	367,510	5,219,031	19:24:00	Occupied
40037a	373,984	5,228,148	18:13:00	Occupied
40055a	372,334	5,224,178	18:07:00	Occupied
2047	370,195	5,216,578	17:31:00	Occupied
2011	383,232	5,219,483	17:15:00	Occupied
40130a	375,933	5,228,266	15:34:00	Unoccupied
60066	375,965	5,211,018	15:05:00	Occupied
60018a	371,895	5,212,263	14:52:00	Occupied
2014	379,983	5,218,952	14:51:00	Non-Residential
40097	368,972	5,227,351	14:12:00	Occupied
6096	366,619	5,217,768	14:05:00	Occupied
2045	370,218	5,216,534	13:34:00	Occupied
60054	376,515	5,211,062	13:16:00	Occupied
40076a	370,151	5,225,694	12:46:00	Non-Residential
60016	372,129	5,214,610	12:29:00	Occupied
60048	376,397	5,210,435	10:58:00	Occupied
40134a	371,186	5,223,960	10:49:00	Occupied
40342	370,909	5,226,405	10:49:00	Non-Residential
2063	373,499	5,211,684	9:24:00	Unoccupied
60012a	371,877	5,212,797	9:22:00	Unoccupied
40077	370,102	5,225,602	9:14:00	Occupied

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
60080	369,491	5,212,432	8:33:00	Occupied
2013	380,100	5,218,948	8:04:00	Non-Residential
60052	376,671	5,210,591	6:59:00	Occupied
40086	368,967	5,226,144	5:51:00	Occupied
40343	370,818	5,228,021	5:35:00	Unoccupied
6099	366,688	5,218,078	5:22:00	Occupied
60020a	372,243	5,211,194	5:04:00	Occupied
2020	365,973	5,217,765	5:03:00	Occupied
60083	368,754	5,212,014	5:03:00	Occupied
60070	376,164	5,212,140	4:26:00	Occupied
40081	369,701	5,225,578	4:25:00	Occupied
2066a	365,765	5,216,992	4:15:00	Occupied
2068	364,110	5,219,367	4:10:00	Occupied
60090	368,671	5,211,608	4:03:00	Occupied
2036	372,317	5,216,000	3:57:00	Occupied
60092	368,562	5,211,213	3:53:00	Occupied
60085	368,637	5,211,618	3:52:00	Occupied
2030	374,516	5,216,892	3:30:00	Occupied
2016	372,754	5,218,312	3:24:00	Occupied
60076	376,229	5,212,642	3:13:00	Occupied
40112	371,312	5,222,602	2:45:00	Occupied
40033	373,882	5,225,842	2:43:00	Occupied
390019	369,513	5,212,867	2:42:00	Non-Residential
40105a	367,270	5,227,370	2:27:00	Occupied
40135	371,067	5,223,960	2:20:00	Occupied
2062	372,289	5,222,275	2:06:00	Occupied
2058	375,404	5,220,251	2:02:00	Occupied
40100	367,556	5,227,926	1:56:00	Occupied
60027a	373,800	5,209,328	1:45:00	Occupied
40139a	369,726	5,224,097	1:24:00	Non-Residential
2064	366,589	5,221,003	1:01:00	Unoccupied
40060	372,120	5,223,886	1:01:00	Unoccupied
2012	380,630	5,217,738	0:00:00	Unoccupied
2015	376,198	5,217,497	0:00:00	Occupied
2051	378,621	5,221,835	0:00:00	Occupied
2052	378,705	5,221,297	0:00:00	Unoccupied
2053	379,196	5,221,219	0:00:00	Occupied
2054	376,457	5,222,208	0:00:00	Occupied
2055	376,380	5,222,201	0:00:00	Occupied
2056	375,960	5,222,198	0:00:00	Occupied
2057	375,513	5,220,742	0:00:00	Occupied
2059	374,606	5,221,973	0:00:00	Occupied
2060	374,367	5,222,200	0:00:00	Occupied
2061	373,618	5,222,265	0:00:00	Non-Residential
2065	366,333	5,220,865	0:00:00	Occupied
2066	366,175	5,220,821	0:00:00	Occupied
2067	366,079	5,220,821	0:00:00	Occupied

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
2041	371,025	5,215,602	0:00:00	Occupied
2053	367,280	5,216,355	0:00:00	Occupied
2057a	367,248	5,215,913	0:00:00	Occupied
2060a	368,839	5,215,450	0:00:00	Occupied
60002a	375,123	5,214,163	0:00:00	Unoccupied
60024a	372,255	5,209,130	0:00:00	Occupied
60035	374,268	5,209,331	0:00:00	Occupied
60040	375,079	5,209,360	0:00:00	Non-Residential
60042	375,320	5,209,336	0:00:00	Occupied
60044	375,770	5,209,460	0:00:00	Occupied
40001a	376,933	5,223,953	0:00:00	Occupied
40011a	375,671	5,223,949	0:00:00	Non-Residential
40018a	375,524	5,224,880	0:00:00	Occupied
40021a	376,428	5,227,682	0:00:00	Occupied
40025	375,732	5,229,916	0:00:00	Occupied
40028a	375,368	5,229,059	0:00:00	Non-Residential
40031	375,434	5,226,226	0:00:00	Occupied
40044	375,953	5,224,137	0:00:00	Occupied
40049	373,825	5,224,083	0:00:00	Non-Residential
40051	373,899	5,223,691	0:00:00	Occupied
40089	367,924	5,226,018	0:00:00	Occupied
40093a	367,907	5,226,008	0:00:00	Occupied
40099	367,401	5,228,151	0:00:00	Occupied
40107a	365,871	5,224,958	0:00:00	Occupied
40110b	366,065	5,224,523	0:00:00	Occupied
40116a	372,859	5,222,443	0:00:00	Occupied
40120	373,474	5,222,500	0:00:00	Occupied
40124	374,934	5,222,439	0:00:00	Occupied
40140a	368,909	5,223,606	0:00:00	Unoccupied
40142	367,963	5,222,567	0:00:00	Non-Residential
40149a	367,475	5,223,178	0:00:00	Occupied
40152a	365,746	5,223,799	0:00:00	Unoccupied
40155a	366,297	5,223,595	0:00:00	Occupied
40193	365,836	5,222,281	0:00:00	Unoccupied
40196	365,654	5,221,719	0:00:00	Occupied
40198	365,596	5,221,731	0:00:00	Occupied
40323	365,791	5,225,833	0:00:00	Occupied
40324	365,832	5,226,445	0:00:00	Non-Residential
40326	365,834	5,226,625	0:00:00	Non-Residential
40329	364,837	5,227,355	0:00:00	Occupied
40333a	365,619	5,228,487	0:00:00	Occupied
40336a	373,387	5,228,862	0:00:00	Unoccupied
60028	373,971	5,209,320	0:00:00	Occupied
40128	372,293	5,228,874	0:00:00	Non-Residential

Baldwin Wind Energy Center
WindPro Shadow Flicker Analysis Results Summary
Turbine Scenario B (no Alternates)

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
2027	369,737	5,218,420	84:43:00	Unoccupied
40074a	370,668	5,225,623	32:34:00	Non-Residential
40039	373,837	5,227,612	32:15:00	Occupied
2018	368,373	5,219,341	29:57:00	Occupied
40066	372,315	5,225,695	28:01:00	Occupied
2050	368,883	5,216,631	27:32:00	Occupied
2025a	370,431	5,218,318	26:26:00	Unoccupied
41014a	368,950	5,226,845	26:15:00	Non-Residential
41013a	368,951	5,226,825	25:46:00	Non-Residential
2063	372,584	5,220,687	22:59:00	Occupied
6100a	372,687	5,220,626	21:09:00	Occupied
2028	371,097	5,217,187	20:54:00	Occupied
40069	372,228	5,226,802	20:11:00	Unoccupied
40070a	372,259	5,227,439	19:04:00	Unoccupied
40055a	372,334	5,224,178	18:07:00	Occupied
40125a	372,393	5,227,947	17:51:00	Non-Residential
2047	370,195	5,216,578	17:31:00	Occupied
2019	367,510	5,219,031	17:20:00	Occupied
2011	383,232	5,219,483	17:15:00	Occupied
2020	369,311	5,219,083	16:44:00	Occupied
2024	369,232	5,219,059	15:54:00	Occupied
40130a	375,933	5,228,266	15:34:00	Unoccupied
2014	379,983	5,218,952	14:51:00	Non-Residential
40097	368,972	5,227,351	14:12:00	Occupied
6096	366,619	5,217,768	14:05:00	Occupied
40037a	373,984	5,228,148	13:44:00	Occupied
2045	370,218	5,216,534	13:34:00	Occupied
40076a	370,151	5,225,694	12:46:00	Non-Residential
60016	372,129	5,214,610	12:29:00	Occupied
40134a	371,186	5,223,960	10:49:00	Occupied
40342	370,909	5,226,405	10:49:00	Non-Residential
40063a	372,312	5,224,843	10:33:00	Unoccupied
40077	370,102	5,225,602	9:14:00	Occupied
2013	380,100	5,218,948	8:04:00	Non-Residential
40086	368,967	5,226,144	5:51:00	Occupied
40343	370,818	5,228,021	5:35:00	Unoccupied
6099	366,688	5,218,078	5:22:00	Occupied
2020	365,973	5,217,765	5:03:00	Occupied
2066a	365,765	5,216,992	4:15:00	Occupied
2068	364,110	5,219,367	4:10:00	Occupied
2036	372,317	5,216,000	3:57:00	Occupied
2030	374,516	5,216,892	3:30:00	Occupied

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
2016	372,754	5,218,312	3:24:00	Occupied
40112	371,312	5,222,602	2:45:00	Occupied
40081	369,701	5,225,578	2:44:00	Occupied
40033	373,882	5,225,842	2:43:00	Occupied
40105a	367,270	5,227,370	2:27:00	Occupied
40135	371,067	5,223,960	2:20:00	Occupied
2062	372,289	5,222,275	2:06:00	Occupied
2058	375,404	5,220,251	2:02:00	Occupied
40100	367,556	5,227,926	1:56:00	Occupied
40139a	369,726	5,224,097	1:24:00	Non-Residential
2064	366,589	5,221,003	1:01:00	Unoccupied
40060	372,120	5,223,886	1:01:00	Unoccupied
2012	380,630	5,217,738	0:00:00	Unoccupied
2015	376,198	5,217,497	0:00:00	Occupied
2051	378,621	5,221,835	0:00:00	Occupied
2052	378,705	5,221,297	0:00:00	Unoccupied
2053	379,196	5,221,219	0:00:00	Occupied
2054	376,457	5,222,208	0:00:00	Occupied
2055	376,380	5,222,201	0:00:00	Occupied
2056	375,960	5,222,198	0:00:00	Occupied
2057	375,513	5,220,742	0:00:00	Occupied
2059	374,606	5,221,973	0:00:00	Occupied
2060	374,367	5,222,200	0:00:00	Occupied
2061	373,618	5,222,265	0:00:00	Non-Residential
2065	366,333	5,220,865	0:00:00	Occupied
2066	366,175	5,220,821	0:00:00	Occupied
2067	366,079	5,220,821	0:00:00	Occupied
2041	371,025	5,215,602	0:00:00	Occupied
2053	367,280	5,216,355	0:00:00	Occupied
2057a	367,248	5,215,913	0:00:00	Occupied
2060a	368,839	5,215,450	0:00:00	Occupied
2063	373,499	5,211,684	0:00:00	Unoccupied
60002a	375,123	5,214,163	0:00:00	Unoccupied
60005	372,824	5,212,708	0:00:00	Non-Residential
60010a	372,900	5,213,255	0:00:00	Unoccupied
60012a	371,877	5,212,797	0:00:00	Unoccupied
60018a	371,895	5,212,263	0:00:00	Occupied
60020a	372,243	5,211,194	0:00:00	Occupied
60024a	372,255	5,209,130	0:00:00	Occupied
60027a	373,800	5,209,328	0:00:00	Occupied
60035	374,268	5,209,331	0:00:00	Occupied
60040	375,079	5,209,360	0:00:00	Non-Residential
60042	375,320	5,209,336	0:00:00	Occupied
60044	375,770	5,209,460	0:00:00	Occupied
60048	376,397	5,210,435	0:00:00	Occupied
60052	376,671	5,210,591	0:00:00	Occupied

Baldwin Receptor ID	UTM-E (m)	UTM-N (m)	WindPro Predicted Expected Shadow Flicker (Hours per Year)	Receptor Status
60054	376,515	5,211,062	0:00:00	Occupied
60058	376,209	5,210,903	0:00:00	Occupied
60062	375,973	5,210,859	0:00:00	Occupied
60070	376,164	5,212,140	0:00:00	Occupied
60076	376,229	5,212,642	0:00:00	Occupied
60080	369,491	5,212,432	0:00:00	Occupied
60083	368,754	5,212,014	0:00:00	Occupied
60085	368,637	5,211,618	0:00:00	Occupied
60090	368,671	5,211,608	0:00:00	Occupied
60092	368,562	5,211,213	0:00:00	Occupied
40001a	376,933	5,223,953	0:00:00	Occupied
40011a	375,671	5,223,949	0:00:00	Non-Residential
40018a	375,524	5,224,880	0:00:00	Occupied
40021a	376,428	5,227,682	0:00:00	Occupied
40025	375,732	5,229,916	0:00:00	Occupied
40028a	375,368	5,229,059	0:00:00	Non-Residential
40031	375,434	5,226,226	0:00:00	Occupied
40044	375,953	5,224,137	0:00:00	Occupied
40049	373,825	5,224,083	0:00:00	Non-Residential
40051	373,899	5,223,691	0:00:00	Occupied
40089	367,924	5,226,018	0:00:00	Occupied
40093a	367,907	5,226,008	0:00:00	Occupied
40099	367,401	5,228,151	0:00:00	Occupied
40107a	365,871	5,224,958	0:00:00	Occupied
40110b	366,065	5,224,523	0:00:00	Occupied
40116a	372,859	5,222,443	0:00:00	Occupied
40120	373,474	5,222,500	0:00:00	Occupied
40124	374,934	5,222,439	0:00:00	Occupied
40140a	368,909	5,223,606	0:00:00	Unoccupied
40142	367,963	5,222,567	0:00:00	Non-Residential
40149a	367,475	5,223,178	0:00:00	Occupied
40152a	365,746	5,223,799	0:00:00	Unoccupied
40155a	366,297	5,223,595	0:00:00	Occupied
40193	365,836	5,222,281	0:00:00	Unoccupied
40196	365,654	5,221,719	0:00:00	Occupied
40198	365,596	5,221,731	0:00:00	Occupied
40323	365,791	5,225,833	0:00:00	Occupied
40324	365,832	5,226,445	0:00:00	Non-Residential
40326	365,834	5,226,625	0:00:00	Non-Residential
40329	364,837	5,227,355	0:00:00	Occupied
40333a	365,619	5,228,487	0:00:00	Occupied
40336a	373,387	5,228,862	0:00:00	Unoccupied
60028	373,971	5,209,320	0:00:00	Occupied
60066	375,965	5,211,018	0:00:00	Occupied
40128	372,293	5,228,874	0:00:00	Non-Residential
390019	369,513	5,212,867	0:00:00	Non-Residential