Appendix B

Aesthetics

SOLANO WIND ENERGY PROJECT

Wind Project Shadow Flicker Assessment

B&V PROJECT NO. 194957
B&V FILE NO. 40.0000

PREPARED FOR

SMUD™

Sacramento Municipal Utility District (SMUD)

3 JANUARY 2019

NO	Date	Revision Issue
1	01/03/2019	Final Report

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

Legal Notice

1.0 Executive Summary

Black & Veatch assessed the shadow flicker impacts of a repowering and expansion of the Solano Wind projects in the Montezuma Hills in Solano County, California. This effort was an evaluation of a repower to existing turbines at Phase 1 as well as new development of turbines at a proposed Phase 4. SMUD has requested the two wind turbine options be evaluated for each phase. The evaluated turbine options were Vestas V136-4.2 model turbines with 82 meter hub heights as well as Vestas V150-4.2 model turbines with 105 meter hub heights. The effort included review of historical studies of the area, survey of aerial imagery for possible Shadow Receptors, shadow flicker modeling, and statistical adjustment of model results to account for cloud cover. Table 1-1 provides worst and realistic case results for the use of V136-4.2 model turbines at Solano Phases 1 and 4 in terms of hours per year shadow flicker added.

Table 1-1 Shadow Flicker Impacts for Vestas V136 Option

Receptor	Easting	Northing	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	610507	4219702	26	20	Unknown
R011	610626	4219713	12	9	Unknown
R012	610666	4219759	14	11	Unknown
R121	603661	4217274	35	28	Unoccupied Barn
R162	602385	4215551	324	249	Unoccupied Barn
R177	601934	4214862	30	23	Unoccupied
R178	601368	4215424	15	12	Demolished

Table 1-2 provides worst and realistic case results for the use of V150-4.2 model turbines at Solano Phases 1 and 4 in terms of hours per year shadow flicker added.

Table 1-2 Shadow Flicker Impacts for Vestas V150 Option

Receptor	Easting	Northing	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	610507	4219702	39	30	Unknown
R011	610626	4219713	20	15	Unknown
R012	610666	4219759	21	16	Unknown
R121	603661	4217274	35	28	Unoccupied Barn
R162	602385	4215551	287	221	Unoccupied Barn
R177	601934	4214862	41	31	Unoccupied
R178	601368	4215424	19	15	Demolished

2.0 Introduction

Black and Veatch completed an analysis of potential shadow flicker from new and repower installations at Solano Wind Park Phases 1 and 4 on nearby residences. SMUD is currently evaluating two options for turbine models and had requested that both be evaluated by Black & Veatch. Option 1 is the installation of Vestas V136-4.2 model turbines and Option 2 is the installation of Vestas V150-4.2 model turbines. Additional detail with respect to the dimensions of the options considered are provided by Table 2-1 below.

Table 2-1 Options for Turbine Implementation Evaluated

Option	Make	Model	Capacity (MW)	Hub Height	Rotor Diameter
1	Vestas	V136-4.20	4.20	82 m	136 m
2	Vestas	V150-4.20	4.20	105 m	150 m

2.1 KEY ASSUMPTIONS AND STUDY LIMITATIONS

- Flicker results contained herein are based on the assumption of use of Vestas V136-4.20 model turbines with 82 m hub heights or Vestas V150-4.20 model turbines with 105 m hub heights at expansion area locations. Changes to the selected model turbines or their locations will invalidate the applicability of flicker results presented herein.
- No future development or repowering of surrounding wind projects was considered. If there is wind farm development in the vicinity of the Solano Wind project, then there may be a potential impact on the perceived shadows at receptors evaluated herein.
- Black & Veatch has assessed the provided information for accuracy and completeness. However, errors in the supplied information may affect the findings of this assessment.

3.0 Data Sources and Methods

Like any tall structure, wind turbines can cast shadows during sunny weather. As the wind turbine operates, the moving rotor blades can cast shadows on nearby homes, an effect known in the wind industry as shadow flicker. Depending on the location and orientation of houses and windows relative to the wind turbines, the position of the sun, and the yaw orientation of the turbine, shadow flicker may occur related to a wind project. The potential for shadow flicker is greatest when the sun is low in the sky.

3.1 SITE DETAILS

Solano Wind currently consists of three project phases located in the Montezuma Hills in Solano County, California. The site is approximately 36 miles southwest of Sacramento, California. Montezuma Hills is a well-known and heavily developed wind area, and the Solano site is adjacent to several existing projects including Shiloh Wind 1 – 4, Montezuma Wind 1 & 2, High Winds Energy, and the EnXco 5 RePower. The shadow flicker calculations do consider neighboring wind farms. This study considers a potential repowering and expansion of Phase 1 of Solano Wind, at the eastern end of the project area, and potential development of a new Phase 4 at the southwestern end of the area.

3.2 SITE TOPOGRAPHY

Black and Veatch sourced elevation data from the USGS National Elevation Dataset (NED). The site consists of moderately sized ridgelines of varying rise and orientation. The elevation within the Solano Wind boundary averages approximately 35 meters, with ridgeline elevations averaging approximately 55 meters. Ridgelines are present within both the Phase 1 and Phase 4 areas. The vegetation consists mostly of grazing land with grass cover, and is largely barren of trees and other structures that might block flicker, with the exception of existing wind turbines. Vegetation information was sourced from the 2011 release of the National Land Cover Database for the United States (NLCD 2011). The shadow flicker calculations include the effects of terrain on shadow projection and visibility, but do not include the potential shadow blocking effects of vegetation or buildings.

3.3 SHADOW RECEPTORS

Black & Veatch reviewed a SMUD provided historical shadow impact analysis for the project area from 2012. The intent of this review was to confirm coordinates and type designations for the Shadow Receptors local to Phase 4. Shadow Receptors are defined as structures which may experience the impacts from the shadow flicker of turbines. This analysis was the primary source for receptor information local to Phase 4. Receptors local to Phase 1 were identified by Black & Veatch via survey of aerial imagery. During this effort, Black & Veatch elected to identify any structure local to Phase 1 that could possibly be considered an occupied building. In total, 12 possible receptors were identified and studied by Black & Veatch respective to Phase 1. The occupancy statuses of these structures are unknown, however the likelihood of occupancy is considered unlikely. Receptor coordinates are provided in the tables featured in the results section to follow.

3.4 WIND TURBINE LAYOUTS

Turbine coordinates for each of the options considered are provided in Appendix A.

3.5 FLICKER MODELLING

WindFarmer 5.3.38, an industry standard wind park design and production modeling software developed by GL Garrad-Hassan, was used to predict shadow flicker from Solano Wind Park Phases 1 and 4. The program calculates sun positions throughout the year and determines those positions relative to the wind turbines and any Shadow Receptors throughout a full year. The presence of shadow flicker at a given location and time is determined based on a line of sight calculation between the sun and the turbines, and the projection of the shadow from the turbine rotor to the receptor. Flicker was modelled from each turbine out to 1,500 meters, as beyond this point shadows are known to diffuse and become indistinguishable.

4.0 Analysis & Results

4.1 WORST CASE SHADOW FLICKER

The WindFarmer shadow model makes several assumptions that overestimate the number of hours that flicker may be visible, and tends to present what could be considered a "worst case" scenario. These assumptions include that the sky is always clear, the turbines are always operating, and are always facing directly into the sun, creating maximum shadowed areas behind them. Under actual operating conditions, cloudy or hazy weather may reduce or eliminate the casting of defined shadows, turbines will face into oncoming wind which will not correspond to the position of the sun, and low wind or turbine maintenance periods may result in turbines idling during shading hours. At this stage, the model also does not consider window location, height, direction, or shading, and does not include shading from trees or other structures, which typically greatly diminishes shadow flicker. Black & Veatch calculated results for this "worst case" shadow flicker scenario are provided in the sections to follow.

4.1.1 V136 – Worst Case

Worst Case results from modeled V136-4.2 wind turbines at Solano Phases 1 and 4 are provided below in Figure 4-1. The figure represents worst case shadow propagation in terms of hours per year resulting specifically from new and repower installations of Vestas V136-4.2 wind turbines at Solano Phases 1 and 4. Results extend outward from each turbine to a distance of 1500 meters. Beyond this point, shadows are considered to have sufficiently lost their distinction and are not considered to be of concern.

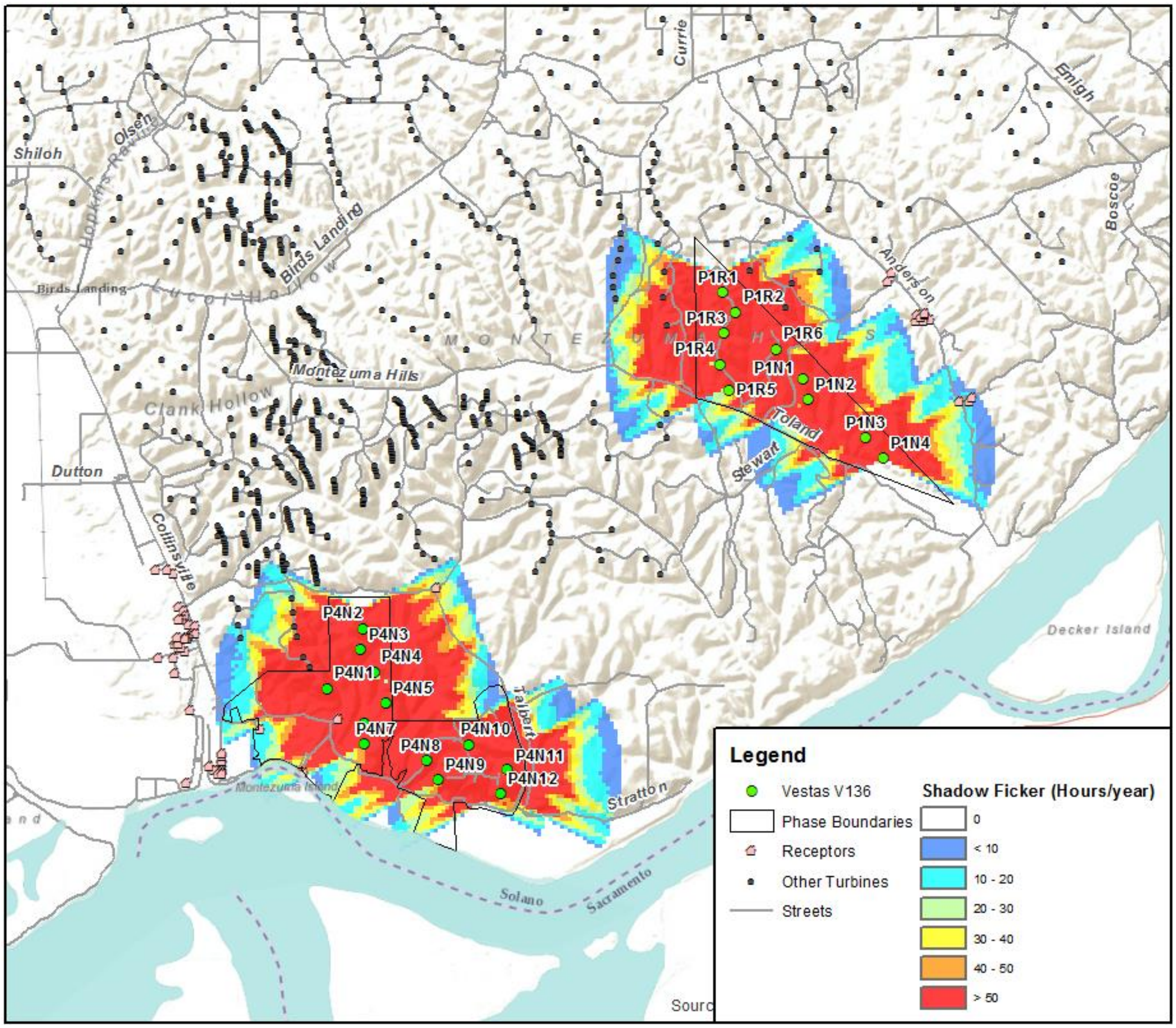

Figure 4-1 Worst Case Shadow Flicker for Vestas V136 Option

4.1.2 V150 – Worst Case

Worst Case results from modeled V150-4.2 wind turbines at Solano Phases 1 and 4 are provided below in Figure 4-2. The figure represents worst case shadow propagation in terms of hours per year resulting specifically from new and repower installations of Vestas V150-4.2 wind turbines at Solano Phases 1 and 4. Results extend outward from each turbine to a distance of 1500 meters. Beyond this point, shadows are considered to have sufficiently lost their distinction and are not considered to be of concern.

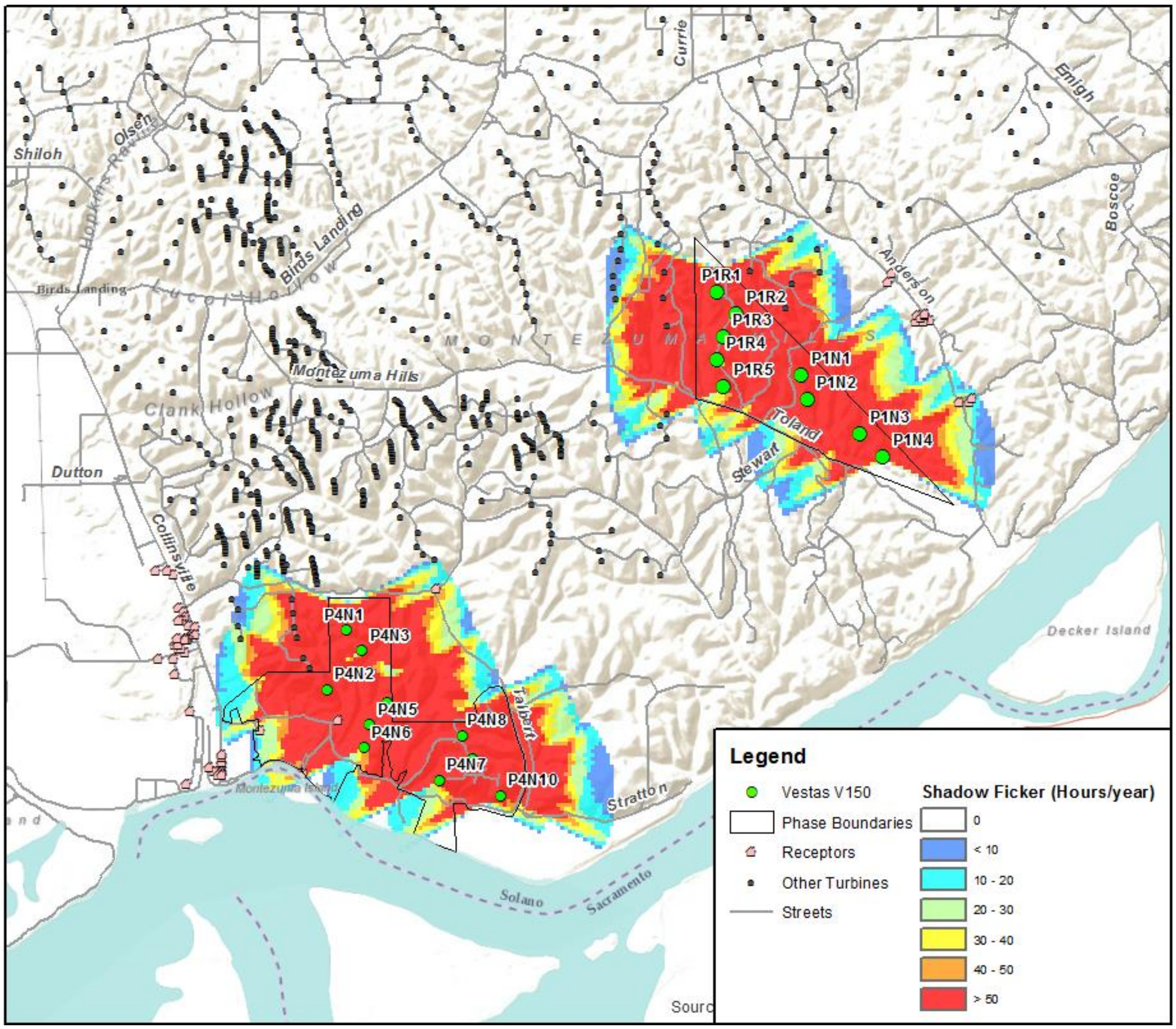

Figure 4-2 Worst Case Shadow Flicker for Vestas V150 Option

4.1.3 Comparison to the Current Existing - Worst Case

It cannot be overlooked that there is already significant development in the area of these Shadow Receptors which must be considered when quantifying the new impacts created by new and repower installations at Solano Phases 1 and 4. This is because of a possibility of concurrent periods in which flicker is present from new and repower installations in location which have already been experiencing flicker. Table 4-1 below provides the perspective of worst case flicker hours before and after the installation of new and repower turbines at Solano Phases 1 and 4. Receptors experiencing a significant change to impact are highlighted in bold.

Table 4-1 Worst Case Comparison of Current Shadow Flicker to Proposed Options

Recept.	Easting	Northing	Current (hr/yr)	V136 (hr/yr)	V150 (hr/yr)	Recept.	Easting	Northing	Current (hr/yr)	V136 (hr/yr)	V150 (hr/yr)
R001	609622	4221398	29	29	29	R138	600382	4216628	39	38	38
R002	609568	4221285	41	41	41	R139	600373	4216608	32	32	32
R003	609946	4220838	13	13	13	R140	600280	4216620	19	19	19
R004	609998	4220812	10	10	10	R141	600302	4216541	21	21	21
R005	610044	4220846	7	7	7	R142	600271	4216544	18	18	18
R006	610051	4220868	7	7	7	R143	600248	4216536	18	18	18
R007	609934	4220762	3	3	3	R144	600287	4216489	27	27	27
R008	610031	4220766	0	0	0	R145	600330	4216482	39	39	39
R009	610111	4220778	0	0	0	R146	600378	4216434	27	27	27
R010	**610507**	**4219702**	**0**	**26**	**39**	R154	600229	4216349	10	10	10
R011	**610626**	**4219713**	**0**	**12**	**20**	R155	600032	4216351	16	16	16
R012	**610666**	**4219759**	**0**	**14**	**21**	R156	600243	4216158	0	0	0
R121	**603661**	**4217274**	**31**	**66**	**66**	R161	600451	4215669	0	0	0
R122	600235	4217459	64	63	63	**R162**	**602385**	**4215551**	**10**	**334**	**297**
R123	600139	4217510	46	46	46	**R177**	**601934**	**4214862**	**0**	**30**	**41**
R124	599995	4217502	43	43	43	**R178**	**601368**	**4215424**	**0**	**15**	**19**
R125	600292	4217020	44	44	44	R179	600867	4215108	0	0	0
R126	600355	4216981	66	65	65	R180	600867	4215071	0	0	0
R127	600376	4216914	78	78	78	R181	600857	4215014	0	0	0
R128	600338	4216855	51	50	50	R182	600865	4214982	0	0	0
R129	600316	4216858	50	50	50	R183	600857	4214933	0	0	0
R130	600298	4216859	50	50	50	R184	600861	4214895	0	0	0
R131	600425	4216798	60	60	60	R185	600857	4214860	0	0	0
R132	600518	4216780	79	79	79	R186	600861	4214832	0	0	0
R133	600467	4216667	42	42	42	R187	600808	4214834	0	0	0
R134	600515	4216676	48	48	48	R188	600763	4214895	0	0	0
R135	600429	4216633	42	42	42	R189	600688	4214945	0	0	0
R136	600409	4216611	41	41	41	R194	600402	4214726	0	0	0
R137	600391	4216610	41	41	41						

4.2 REALISTIC SHADOW FLICKER

In the previous section, it was noted that the “worst case” scenario is model under conservative assumptions such as that the sky is always clear, the turbines are always operating, and are always facing directly into the sun, and that flicker may not even be visible to the location of windows relative to the turbines and other obstacles. For a more realistic result, Black & Veatch attempted to account for the first of those conservative assumptions listed. That is that the sky, in reality, will not always be clear and the possibility for shadows will not always be present. Quantifying this required review of historical cloud patterns in the area.

Historical monthly sunshine hours data were obtained for multiple locations in California from the Automated Surface Observing Systems (ASOS) program. The ASOS station at Travis Air Force Base in Fairfield, CA was the closest available data point. Black & Veatch reviewed this source and selected the most recent 20-year period of record for assessment. Average sunshine in the area expressed as a percent of the total area for this source is shown in Table 4-2.

Table 4-2 Estimated Monthly Cloud Coverage for Fairfield, California

Month	Fairfield, CA
January	62%
February	67%
March	71%
April	76%
May	80%
June	86%
July	90%
August	90%
September	89%
October	81%
November	72%
December	64%
Annual	**77%**

On an annual basis, approximately 77 percent of the area is considered sunny, capable of casting shadows.

In addition to cloud coverage, it is also likely that turbines will not operate continuously because of low winds and maintenance, and will not always be oriented directly between the sun and homes. Therefore, it is realistic that actual shadow flicker at the Solano Wind Park will be significantly lower than the worst-case forecast by the WindFarmer shadow model. Actual flicker is expected to be less than 60 percent of that forecasted. Moreover, flicker would also be reduced by features such as window placement on residences and the presence of trees and awnings, which will also serve to reduce the actual perceived flicker hours. Flicker of approximately 40 percent of the extent of the maximum worst-case of that forecasted by the WindFarmer shadow model is anticipated to reasonably represent the actual shadow flicker from the Solano Wind Park.

Given these considerations, the “realistic case” results to follow include only reductions specific to cloud coverage. This is because of the computational difficulty and level of unknown factors which contribute to the other considerations. Specifics regarding downtime for turbine shutdowns and maintenance, window placement, trees and awnings, and shadow impact of rotor orientation relative to times of cloudiness cannot be known without a significant investigational and computational undertaking. Black & Veatch recommends approaching the “realistic case” results to follow with these caveats in mind.

4.2.1 V136 – Realistic Case

Realistic Case results from modeled V136-4.2 wind turbines at Solano Phases 1 and 4 are provided below in Figure 4-3. The figure represents realistic shadow propagation in terms of hours per year resulting specifically from new and repower installations of Vestas V136-4.2 wind turbines at Solano Phases 1 and 4. Results extend outward from each turbine to a distance of 1500 meters. Beyond this point, shadows are considered to have sufficiently lost their distinction and are not considered to be of concern.

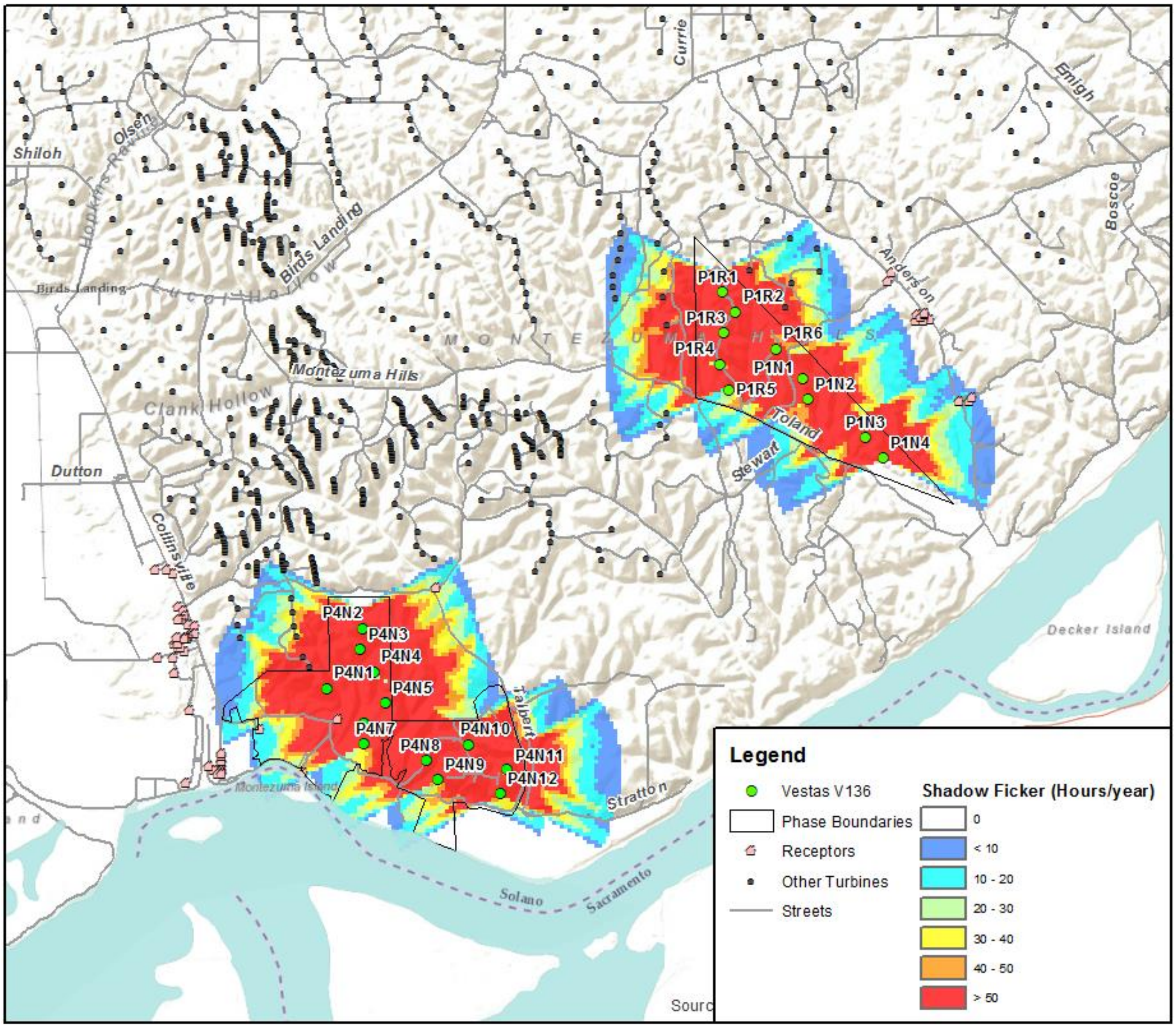

Figure 4-3 Realistic Case Shadow Flicker for Vestas V136 Option

4.2.2 V150 – Realistic Case

Realistic Case results from modeled V150-4.2 wind turbines at Solano Phases 1 and 4 are provided below in Figure 4-4. The figure represents realistic shadow propagation in terms of hours per year resulting specifically from new and repower installations of Vestas V150-4.2 wind turbines at Solano Phases 1 and 4. Results extend outward from each turbine to a distance of 1500 meters.

Beyond this point, shadows are considered to have sufficiently lost their distinction and are not considered to be of concern.

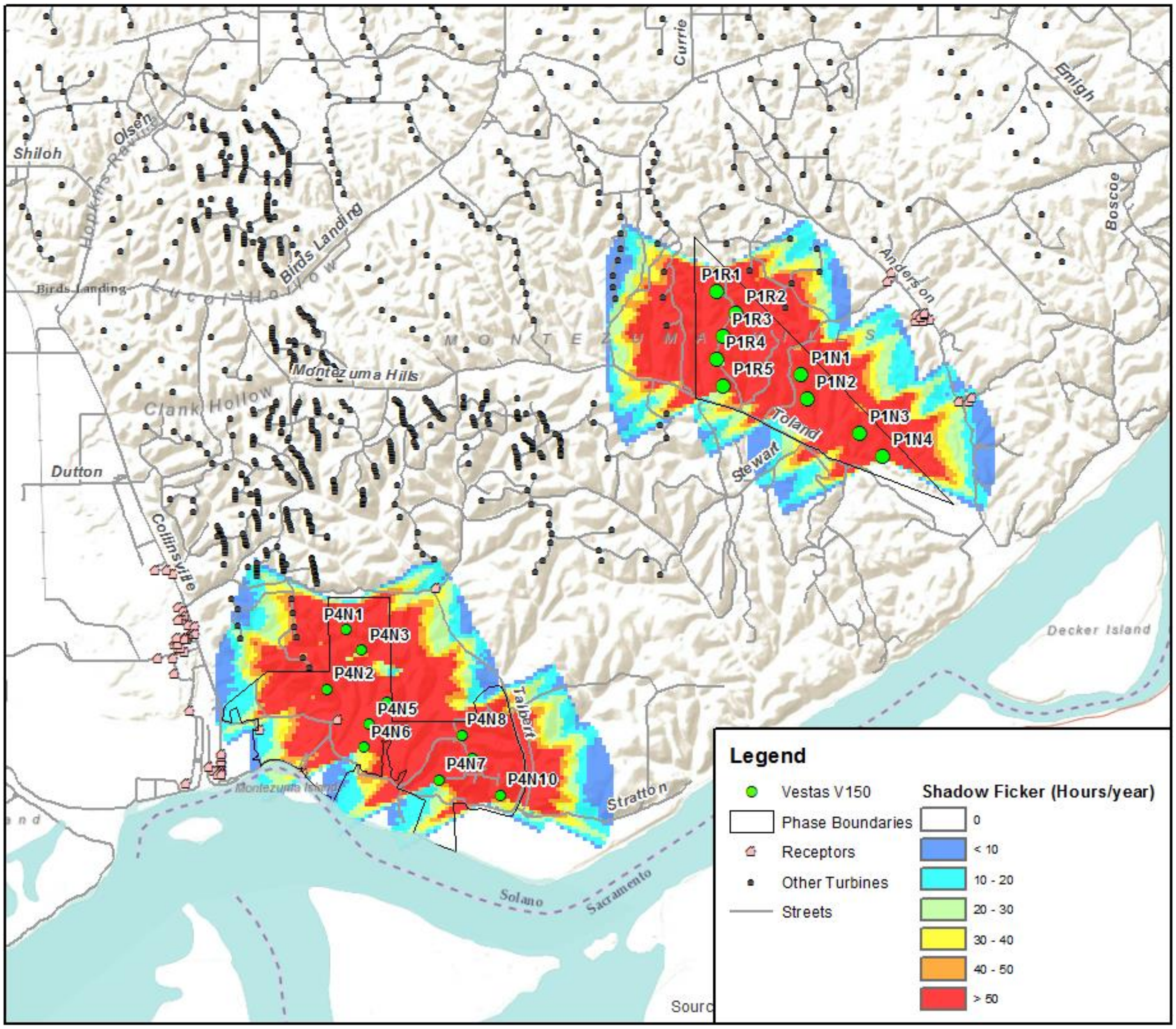

Figure 4-4 Realistic Case Shadow Flicker for Vestas V150 Option

4.2.3 Comparison to the Current Existing - Realistic Case

As was the case for worst case results provided in Section 4.1.3, quantifying the new impacts created by new and repower installations at Solano Phases 1 and 4 requires quantification of existing impacts as well. Table 4-3 below provides the perspective of realistic flicker hours before and after the installation of new and repower turbines at Solano Phases 1 and 4. Receptors experiencing a significant change to impact are highlighted in bold.

Table 4-3 Worst Case Comparison of Current Shadow Flicker to Proposed Options

Recept.	Easting	Northing	Current (hr/yr)	V136 (hr/yr)	V150 (hr/yr)	Recept.	Easting	Northing	Current (hr/yr)	V136 (hr/yr)	V150 (hr/yr)
R001	609622	4221398	22	22	22	R138	600382	4216628	30	29	29
R002	609568	4221285	31	31	31	R139	600373	4216608	25	25	25
R003	609946	4220838	10	10	10	R140	600280	4216620	15	15	15
R004	609998	4220812	8	7	7	R141	600302	4216541	16	16	16
R005	610044	4220846	5	5	5	R142	600271	4216544	14	14	14
R006	610051	4220868	5	5	5	R143	600248	4216536	14	14	14
R007	609934	4220762	2	2	2	R144	600287	4216489	21	21	21
R008	610031	4220766	0	0	0	R145	600330	4216482	30	30	30
R009	610111	4220778	0	0	0	R146	600378	4216434	21	21	21
R010	**610507**	**4219702**	**0**	**20**	**30**	R154	600229	4216349	8	8	8
R011	**610626**	**4219713**	**0**	**9**	**15**	R155	600032	4216351	13	13	13
R012	**610666**	**4219759**	**0**	**11**	**16**	R156	600243	4216158	0	0	0
R121	**603661**	**4217274**	**23**	**51**	**51**	R161	600451	4215669	0	0	0
R122	600235	4217459	49	49	49	**R162**	**602385**	**4215551**	**8**	**257**	**229**
R123	600139	4217510	36	36	36	**R177**	**601934**	**4214862**	**0**	**23**	**31**
R124	599995	4217502	33	33	33	**R178**	**601368**	**4215424**	**0**	**12**	**15**
R125	600292	4217020	34	34	34	R179	600867	4215108	0	0	0
R126	600355	4216981	50	50	50	R180	600867	4215071	0	0	0
R127	600376	4216914	60	60	60	R181	600857	4215014	0	0	0
R128	600338	4216855	39	39	39	R182	600865	4214982	0	0	0
R129	600316	4216858	38	38	38	R183	600857	4214933	0	0	0
R130	600298	4216859	38	38	38	R184	600861	4214895	0	0	0
R131	600425	4216798	46	46	46	R185	600857	4214860	0	0	0
R132	600518	4216780	61	61	61	R186	600861	4214832	0	0	0
R133	600467	4216667	32	32	32	R187	600808	4214834	0	0	0
R134	600515	4216676	37	37	37	R188	600763	4214895	0	0	0
R135	600429	4216633	32	32	32	R189	600688	4214945	0	0	0
R136	600409	4216611	32	31	31	R194	600402	4214726	0	0	0
R137	600391	4216610	32	31	31						

5.0 Conclusions

Based on the realistic and worst case results detailed in Section 4.1 and Section 4.2, a total of 7 structures appear to be impacted by new and repower installations at Solano Phases 1 and 4. Table 5-1 and Table 5-2 provide the understood details of those structures along with the corresponding increase in Shadow Flicker hours per year estimated added. None of the structures listed are known to be occupied at this time, however Black & Veatch recommends this be confirmed to ensure compliance with ordinance requirements and keeping up with general community satisfaction.

Table 5-1 Shadow Flicker Impacts for Vestas V136 Option

Receptor	Easting	Northing	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	610507	4219702	26	20	Unknown
R011	610626	4219713	12	9	Unknown
R012	610666	4219759	14	11	Unknown
R121	603661	4217274	35	28	Unoccupied Barn
R162	602385	4215551	324	249	Unoccupied Barn
R177	601934	4214862	30	23	Unoccupied
R178	601368	4215424	15	12	Demolished

Table 5-2 Shadow Flicker Impacts for Vestas V150 Option

Receptor	Easting	Northing	Worst Case (hr/yr)	Real Case (hr/yr)	Status
R010	610507	4219702	39	30	Unknown
R011	610626	4219713	20	15	Unknown
R012	610666	4219759	21	16	Unknown
R121	603661	4217274	35	28	Unoccupied Barn
R162	602385	4215551	287	221	Unoccupied Barn
R177	601934	4214862	41	31	Unoccupied
R178	601368	4215424	19	15	Demolished

Appendix A. Coordinates of Selected Turbine Options

Appendix A1. Vestas V136-4.20

Table A-4 Vestas V136-4.20 Phase 1 Repower Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P1R1	V136-4.20	82 m	4221140	607399	38.131740	-121.774565	62.63
P1R2	V136-4.20	82 m	4220880	607573	38.129339	-121.772626	56.84
P1R3	V136-4.20	82 m	4220610	607422	38.126931	-121.774385	57.76
P1R4	V136-4.20	82 m	4220200	607363	38.123272	-121.775114	59.57
P1R5	V136-4.20	82 m	4219850	607483	38.120118	-121.773797	31.94
P1R6	V136-4.20	82 m	4220390	608101	38.124925	-121.766670	60.15

Table A-5 Vestas V136-4.20 Phase 1 Addition Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P1N1	V136-4.20	82 m	4220010	608452	38.121453	-121.762721	50.48
P1N2	V136-4.20	82 m	4219740	608514	38.118993	-121.762061	47.41
P1N3	V136-4.20	82 m	4219240	609264	38.114350	-121.753589	27.77
P1N4	V136-4.20	82 m	4218970	609499	38.111947	-121.750938	13.94

Table A-6 Vestas V136-4.20 Phase 4 Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P4N1	V136-4.20	82 m	4215960	602221	38.085641	-121.834375	52.64
P4N2	V136-4.20	82 m	4216750	602695	38.092688	-121.828856	70.47
P4N3	V136-4.20	82 m	4216470	602670	38.090181	-121.829187	65.52
P4N4	V136-4.20	82 m	4216170	602840	38.087507	-121.827289	59.38
P4N5	V136-4.20	82 m	4215770	603002	38.083826	-121.825503	62.02
P4N6	V136-4.20	82 m	4215510	602720	38.081526	-121.828756	31.10
P4N7	V136-4.20	82 m	4215230	602716	38.079048	-121.828842	38.16
P4N8	V136-4.20	82 m	4215020	603532	38.077053	-121.819569	58.22
P4N9	V136-4.20	82 m	4214760	603686	38.074714	-121.817854	53.76
P4N10	V136-4.20	82 m	4215230	604076	38.078825	-121.813340	61.29
P4N11	V136-4.20	82 m	4214910	604588	38.075915	-121.807550	48.35
P4N12	V136-4.20	82 m	4214580	604499	38.072979	-121.808606	44.82

Appendix A2. Vestas V150-4.20

Table A-7 Vestas V150-4.20 Phase 1 Repower Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P1R1	V150-4.20	105 m	4221140	607325	38.131710	-121.775408	61.51
P1R2	V150-4.20	105 m	4220860	607586	38.129139	-121.772471	54.92
P1R3	V150-4.20	105 m	4220560	607410	38.126525	-121.774525	56.86
P1R4	V150-4.20	105 m	4220260	607327	38.123845	-121.775516	55.36
P1R5	V150-4.20	105 m	4219900	607418	38.120594	-121.774541	35.25

Table A-8 Vestas V150-4.20 Phase 1 Addition Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P1N1	V150-4.20	105 m	4220050	608436	38.121802	-121.762906	48.67
P1N2	V150-4.20	105 m	4219750	608513	38.119030	-121.762066	47.59
P1N3	V150-4.20	105 m	4219290	609207	38.114823	-121.754220	34.07
P1N4	V150-4.20	105 m	4218990	609499	38.112136	-121.750943	14.81

Table A-9 Vestas V150-4.20 Phase 4 Turbine Coordinates

WTG #	Model	Height	Northing	Easting	Latitude	Longitude	Elev (m)
P4N1	V150-4.20	105 m	4216740	602484	38.092646	-121.831268	73.51
P4N2	V150-4.20	105 m	4215960	602226	38.085651	-121.834317	52.70
P4N3	V150-4.20	105 m	4216470	602685	38.090189	-121.829013	65.06
P4N4	V150-4.20	105 m	4215780	603013	38.083970	-121.825369	63.36
P4N5	V150-4.20	105 m	4215500	602787	38.081430	-121.827991	30.78
P4N6	V150-4.20	105 m	4215200	602717	38.078793	-121.828832	35.24
P4N7	V150-4.20	105 m	4214770	603695	38.074802	-121.817743	54.80
P4N8	V150-4.20	105 m	4215360	603997	38.080033	-121.814218	64.32
P4N9	V150-4.20	105 m	4215050	604122	38.077278	-121.812832	64.86
P4N10	V150-4.20	105 m	4214570	604499	38.072901	-121.808609	44.85