

Golden Plains Wind Farm

Appendix C.7: Shadow Flicker Impact Assessment

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Golden Plains Wind Farm Shadow Flicker Impact Assessment

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Golden Plains Wind Farm Management Pty Ltd

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Executive Summary

Jacobs were engaged by Golden Plains Wind Farm Management Pty Ltd (GPWFM) to carry out a shadow flicker assessment of Golden Plains Wind Farm (the Project). The Project consists of a 215 wind turbine generator (WTG) layout; this study assesses the impact of two WTG types that have been modelled for shadow flicker impact on nearby dwellings. This report primarily considers the Vestas V162, consisting of a 162m rotor diameter, 230m tip height and 4.3m maximum blade chord, while a hypothetical WTG model that consists of a 165m rotor diameter, 230m tip height and 4.3m maximum blade chord, and the GE 6.0-164 that consists of a 164m rotor diameter, 230m tip height and 4.0m maximum blade chord, are also considered. A previous assessment was carried out by another consultant as part of the planning approvals process. The previous assessment related to the 228 WTG layout with 150m rotor diameter and 230m tip height, assessed under the Project's Environment Effects Statement (EES).

Jacobs' scope assessed dwellings within 3km of a turbine at the Project. 176 dwellings were identified to be within 3km of a turbine, of which, four 'Neighbour' dwellings were predicted to be subject to shadow flicker under the V162 and hypothetical WTG assessments, while only three were predicted to be subject to shadow flicker under the GE 6.0-162 assessment. Another 'Neighbour' dwelling and a further 'Host' dwelling, which were predicted to be subject to shadow flicker in the previous assessment, are now not predicted to be impacted under any of the three assessments.

Shadow flicker at 'H32 - a' is predicted to exceed the maximum of 30 hours per annum under the V162 and hypothetical WTG assessments, however Jacobs understands that GPWFM has reached an agreement with the landowner to waive this requirement, in accordance with Planning Permit PA1700266¹ (the Permit) Condition 33.

Results for relevant dwellings are detailed in Table 1, which, combined with the agreement to waive shadow flicker requirements at 'H32 - a' (in the case of the the V162 and hypothetical WTG model), confirm that the Vestas V162, hypothetical WTG model, and GE 6.0-164 all comply at all assessed dwellings with the shadow flicker limits set out in Condition 33 of the Permit.

Table 1: Shadow flicker results for relevant dwellings

'Neighbour' Dwelling	EES Assessment (228 WTG layout, 150m rotor diameter) (Hrs:Mins per Annum)	V162 Assessment (WTG layout v39-01, Vestas V162, 162m rotor diameter, 4.3m max. blade chord) (Hrs:Mins per Annum)	Hypothetical WTG Assessment (WTG layout v39-01, hypothetical WTG model, 165m rotor diameter, 4.3m max. blade chord) (Hrs:Mins per Annum)	GE 6.0-164 Assessment (WTG layout v39-01, GE 6.0-164, 164m rotor diameter, 4.0m max. blade chord) (Hrs:Mins per Annum)
H32 - a	28:10	55:01	57:16	26:05
M35 - b	27:16	29:04	29:55	29:40
P32 - a	Not considered	23:18	24:25	24:00
U18 - a	20:18	22:28	23:23	0:00
X18 - a	74:59	0:00	0:00	0:00
L32 - a ('Host')	26:12	0:00	0:00	0:00

¹ GPWF_PermitConditions_V01-04_Corrected190429.pdf

Important note about your report

The sole purpose of this report and the associated services performed by Jacobs is to assess the shadow flicker at receptors nearby to Golden Plains Wind Farm in Victoria in accordance with the scope of services set out in the contract between Jacobs and Golden Plains Wind Farm Management Pty Ltd (referred to as the Client).

In preparing this report, Jacobs has relied upon, and presumed accurate, any information (or confirmation of the absence thereof) provided by the Client and from other sources. Except as otherwise stated in the report, Jacobs has not attempted to verify the accuracy or completeness of any such information. If the information is subsequently determined to be false, inaccurate or incomplete then it is possible that our observations and conclusions as expressed in this report may change.

Jacobs derived the data in this report from information sourced from the Client and available in the public domain at the time outlined in this report. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Jacobs has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law.

This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Jacobs for use of any part of this report in any other context.

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1. Introduction

Jacobs were engaged by Golden Plains Wind Farm Management Pty Ltd (GPWFM) to undertake a shadow flicker assessment of Golden Plains Wind Farm (the Project). The Project is located near Rokewood, Victoria, approximately 40km South-South West of Ballarat and 60km North West of Geelong. The Project was approved under Planning Permit PA1700266² (the Permit).

Based on a desktop review, the project site appears mainly flat and comprises generally open grasslands and sparse shrubs.

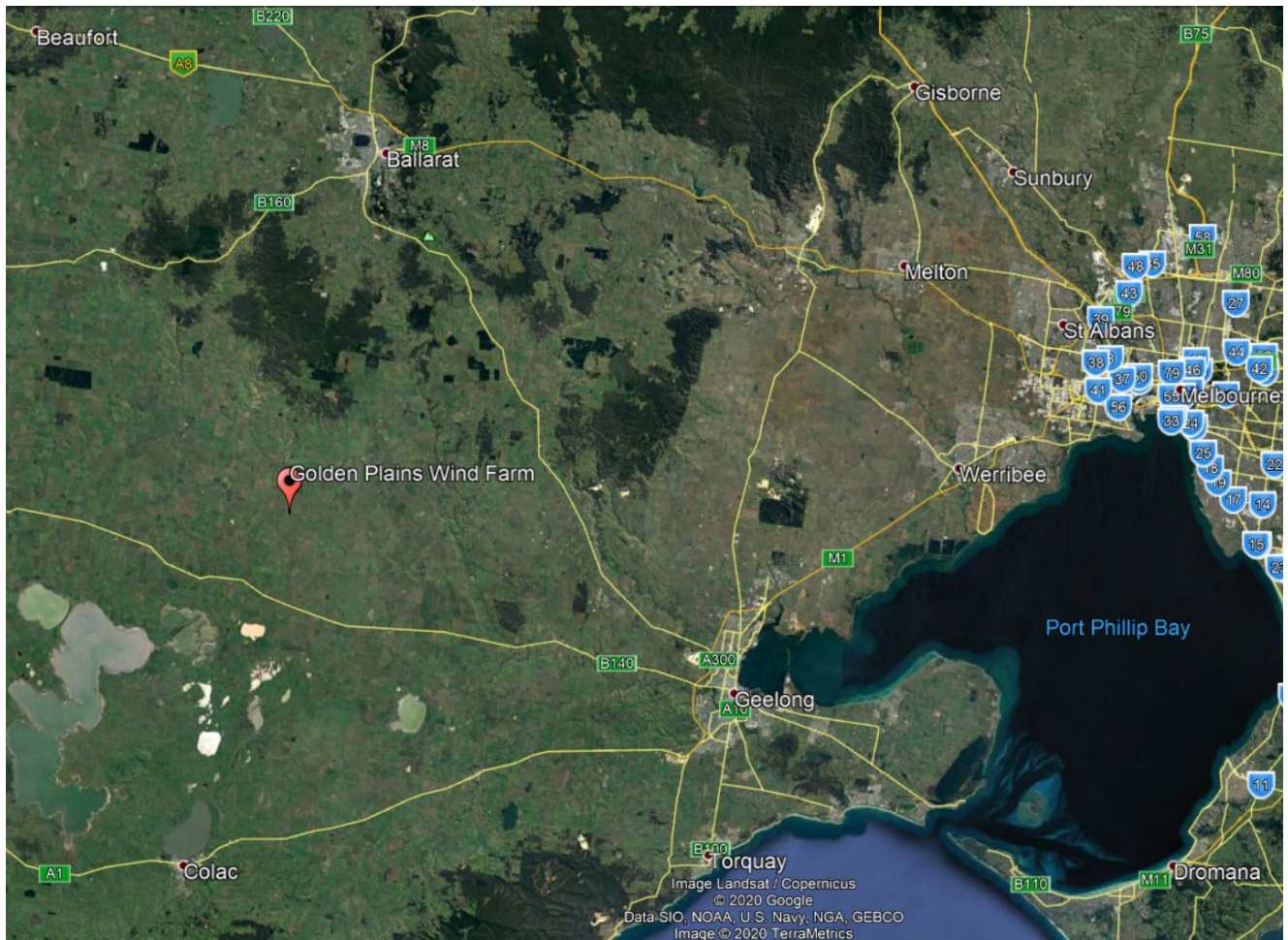


Figure 1 Location of Golden Plains Wind Farm

GPWFM has adjusted the Project's wind turbine generator (WTG) layout in response to conditions in the Permit. This has resulted in a reduction from the approved 228 WTGs to the current 215 WTGs. GPWFM has also increased the WTG rotor diameter to 162m, while maintaining a tip height of 230m.

This report details the methodology and results of shadow flicker assessments for the current 215 WTG layout, using three different WTG types. This report primarily considers the Vestas V162, consisting of a 162m rotor diameter, 230m tip height and 4.3m maximum blade chord, while a hypothetical WTG model that consists of a 165m rotor diameter, 230m tip height and 4.3m maximum blade chord, and the GE 6.0-164 that consists of a 164m rotor diameter, 230m tip height and 4.0m maximum blade chord, are also considered. WTG coordinates can be found in Appendix A.

² GPWF_PermitConditions_V01-04_Corrected190429.pdf

2. Shadow Flicker Assessment

A 'modelled' assessment procedure is followed, as described in the Draft National Wind Farm Development Guidelines, 2010³ (National Guidelines), considering a worst-case scenario of no cloud cover and WTG rotors always facing the Sun. This method has an associated acceptable level of shadow flicker of 30 hours per annum. Openwind (Version 01.09.00.3647n) was used to carry out shadow flicker calculations.

Data inputs, assumptions and parameters used in this assessment are discussed below.

2.1 Methodology

2.1.1 Data Inputs

The following data, provided by GPWFM, was used in the shadow flicker assessment, and assumed by Jacobs to be accurate and correct:

- WTG layout v39-01 shapefile (*gpwf_wtglayout_v39-01.shp*)
- Receptor locations shapefile (*gpwf_dwelling_v10-02_Redacted.shp*)
- 1 arc-second (~30m) resolution raster elevation data (*gpwf_SRTMelevation_v20-03.tif*)
- Vestas V162 General Description document (*0081-5017_V03 - General Description EnVentus 5_6 MW.pdf*) – source of WTG rotor diameter and maximum blade chord

2.1.2 Assumptions and Parameters

The following Table 2.1 details assumptions that were made and parameters used in the shadow flicker assessment, taking guidance from the National Guidelines:

Table 2.1: Key shadow flicker analysis parameters

Model Parameter	Value
Default observer eye level	1.5m
Interval for checking line of sight	5m
Minimum angle to the sun	3°
Year of modelling (One full year, representing a non-leap year, 12 to 15 years after the date of DA submission)	2031
Grid size for mapping	25m
WTG Parameter	Value
Hub height	149m
Rotor diameter	162m
Zone (radius) of influence of shadows (265 x maximum blade chord)	265 x 4.3m = 1,140m (rounded up from 1,139.5m)

³ <http://www.nepc.gov.au/system/files/resources/8e446a1a-ab93-5f84-99d0-12d3422d2a23/files/draft-national-wind-farm-development-guidelines-july-2010.pdf>

The zone of influence, as defined in the National Guidelines, extends 1,140m from each WTG at Golden Plains Wind Farm. As such, all dwellings beyond this distance from a WTG have an assumed value of zero hours of shadow flicker per annum.

2.1.3 Receptors

The receptor locations provided by GPWFM were filtered to assess only receptors within 3km of any WTG. This was done for efficiency of calculation, and for illustration in the shadow flicker map in Appendix C, with the actual zone (radius) of influence of shadows being up to 1,140m from WTGs. Of the remaining receptors, only those categorised in the receptor locations shapefile as a type of dwelling (i.e. 'House' or other form of accommodation) were considered in the assessment. For clarity, sheds were not considered a type of dwelling.

A 'Host' or a 'Neighbour' classification indicates whether or not a receptor is a participating landowner. Jacobs assumes that GPWFM has agreements with Host landowners that waives the requirement for shadow flicker at these locations to not exceed 30 hours per annum, as per Condition 33 of the Permit, which states:

Shadow flicker from the facility must not exceed 30 hours per annum at any dwelling existing at 17 August 2017, unless the operator has entered into an agreement with the relevant landowner waiving this requirement. Evidence of the agreement must be provided to the satisfaction of the responsible authority upon request, and be in a form that applies to the land for the life of the wind energy facility. The agreement must be to the satisfaction of the responsible authority.

Jacobs has relied upon the characterisation and accuracy of the receptor location data provided by GPWFM.

2.2 Results

Of the 176 dwellings at which shadow flicker was assessed, Table 2.2 lists the 'Neighbour' dwellings predicted to be subject to shadow flicker as a result of the Project operating with the V162 WTG.

Results for all 176 dwellings can be found in Appendix B. A shadow flicker map can also be found in Appendix C.

Shadow flicker at 'H32 - a' is predicted to exceed the maximum of 30 hours per annum, however Jacobs understands that GPWFM has reached an agreement with the landowner to waive this requirement; with the waiver in place the Project satisfies the requirements of Condition 33 of the Permit. For clarity, Jacobs has not reviewed this agreement.

Table 2.2: 'Neighbour' dwellings predicted to be subject to shadow flicker utilising V162 WTG

'Neighbour' Dwelling	Shadow Flicker (Hrs:Mins per Annum)	Result
H32 - a	55:01	Compliant on the basis an agreement is in place/has been reached ⁴
M35 - b	29:04	Compliant
P32 - a	23:18	Compliant
U18 - a	22:28	Compliant

⁴ Jacobs has not sighted an agreement

2.2.1 Comparison with EES Assessment

Table 2.3 compares the results of the current, V162 shadow flicker assessment with the results of the previous shadow flicker assessment, which formed Appendix O of the Golden Plains Wind Farm Environment Effects Statement (EES)⁵, referred to as the EES assessment.

Jacobs understands that 'P32 - a' was not considered in the EES assessment as it was previously categorised as a shed. 'P32 - a' has since been recategorised and is considered as a 'Neighbour' dwelling in the V162 assessment.

Jacobs understands that 'X18 - a' was previously classified as a 'Host' dwelling at the time of the EES shadow flicker assessment. This dwelling has since been recategorised as a 'Neighbour' dwelling and under the V162 assessment is now considered to not be subject to any shadow flicker. This is because 'X18 - a' is now not situated within any WTG's zone of influence.

A further 'Host' dwelling, 'L32 - a', is now also considered to not be subject to any shadow flicker under the V162 assessment. This is because 'L32 - a' is now not situated within any WTG's zone of influence.

Table 2.3: Shadow flicker results comparison

'Neighbour' Dwelling	EES Assessment (Hrs:Mins per Annum)	V162 Assessment (Hrs:Mins per Annum)
H32 - a	28:10	55:01
M35 - b	27:16	29:04
P32 - a	Not considered	23:18
U18 - a	20:18	22:28
X18 - a	74:59	0:00
L32 - a ('Host')	26:12	0:00

2.2.2 Hypothetical WTG Assessment

An assessment was carried out to consider shadow flicker impact as a result of the Project utilising a hypothetical WTG model of 165m rotor diameter. This assessment was carried out using the modelling parameters previously shown in Table 2.1 and the WTG parameters shown below in Table 2.4.

Table 2.4: Hypothetical WTG parameters

WTG Parameter	Value
Hub height	149m
Rotor diameter	165m
Zone (radius) of influence of shadows (265 x maximum blade chord)	265 x 4.3m = 1,140m (rounded up from 1,139.5m)

As expected, shadow flicker duration increases slightly when rotor diameter is increased from 162m to 165m, when compared to the V162 assessment, as shown in Table 2.5.

⁵ Appendix O. GPWF EES Shadow Flicker Assessment.pdf

Table 2.5: V162 and hypothetical WTG results

'Neighbour' Dwelling	Vestas V162 162m rotor diameter, 4.3m maximum blade chord (Hrs:Mins per Annum)	Hypothetical WTG 165m rotor diameter, 4.3m maximum blade chord (Hrs:Mins per Annum)
H32 - a	55:01	57:16
M35 - b	29:04	29:55
P32 - a	23:18	24:25
U18 - a	22:28	23:23

2.2.3 Consideration of GE 6.0-164

An assessment was also carried out to consider shadow flicker impact as a result of the Project utilising the GE 6.0-164. This assessment was carried out using the modelling parameters previously shown in Table 2.1 and the WTG parameters shown in Table 2.6. Rotor diameter and maximum blade chord are taken from the Technical Description and Data document⁶ of the GE 6.0-164, which Jacobs has reviewed.

Table 2.6: GE 6.0-164 WTG parameters

WTG Parameter	Value
Hub height	148m
Rotor diameter	164m
Zone (radius) of influence of shadows (265 x maximum blade chord)	265 x 4.3m = 1,060m

As expected, shadow flicker duration increases slightly at dwellings 'M35 - b' and 'P32 - a' when rotor diameter is increased from 162m to 164m, when compared to the V162 assessment, as shown Table 2.7.

In contrast to the V162 assessment, no shadow flicker is predicted at 'U18 - a' from the GE 6.0-164 WTG, due to the reduced maximum blade chord of 4.0m (compared to 4.3m) reducing the zone of influence around each WTG from 1,140m to 1,060m, and the situation of 'U18 - a' being more than 1,060m from the nearest WTG (WTG162). Shadow flicker is also significantly lower (less than 30 hours per annum) at 'H32 - a' from the GE 6.0-164 compared to the V162, as it is within the zone of influence of one WTG (WTG014) instead of two WTGs (WTG010 and WTG014).

Table 2.7: V162 and GE 6.0-164 results

'Neighbour' Dwelling	Vestas V162 162m rotor diameter, 4.3m maximum blade chord (Hrs:Mins per Annum)	GE 6.0-164 164m rotor diameter, 4.0m maximum blade chord (Hrs:Mins per Annum)
H32 - a	55:01	26:05
M35 - b	29:04	29:40
P32 - a	23:18	24:00
U18 - a	22:28	0:00

⁶ Weights_and_Dimensions_6.0-164_xxHz_EN_Doc-0082611_r01.pdf

3. Blade Glint

The Permit does not include a condition regarding blade glint, however Section 5.1.2 (b) of the *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria*⁷ states:

Blade glint can result from the sun reflecting from turbine blades. Blades should be finished with a surface treatment of low reflectivity to ensure that glint is minimised.

Jacobs has reviewed the General Description document⁸ of the Vestas V162, which states that the standard blade, nacelle and tower colour is RAL 7035 (light grey). Whilst the documentation does not specifically state that this has a matte finish, such a finish is typical of modern WTGs, meaning that blade glint is generally not an issue.

⁷ https://www.planning.vic.gov.au/_data/assets/pdf_file/0030/9696/Policy-and-Planning-Guidelines-for-Development-of-Wind-Energy-Facilities-in-Victoria.pdf

⁸ 0081-5017_V03 - General Description EnVentus 5_6 MW.pdf

4. Summary

Jacobs has assessed the potential for shadow flicker effects from the current 215 WTG layout for Golden Plains Wind Farm at the 176 dwellings situated within 3km from any WTG. Three WTG types were considered: The Vestas V162, consisting of a 162m rotor diameter, 230m tip height and 4.3m maximum blade chord; a hypothetical WTG model with a 165m rotor diameter, 230m tip height and 4.3m maximum blade chord; and the GE 6.0-164 with a 164m rotor diameter, 230m tip height and 4.0m maximum blade chord.

A 'modelled' assessment for the V162 and aforementioned hypothetical WTG model determined that of the 176 nearby dwellings, four 'Neighbour' dwellings were predicted to be subject to shadow flicker. Shadow flicker at three of these dwellings is not predicted to exceed the maximum of 30 hours per year, however it is predicted to exceed 30 hours per year at dwelling 'H32 - a'. Jacobs understands that GPWFM has reached an agreement with the relevant landowner to waive this shadow flicker requirement at 'H32 - a'. With this agreement in place, Golden Plains Wind Farm will satisfy Condition 33 of the Permit if utilising the V162 or aforementioned hypothetical WTG model.

A 'modelled' assessment for the GE 6.0-164 determined that of the same 176 nearby dwellings, only three 'Neighbour' dwellings were predicted to be subject to shadow flicker, with the maximum of 30 hours per year not exceeded at any of these dwellings. Golden Plains Wind Farm will therefore satisfy Condition 33 of the Permit if utilising the GE 6.0-164.

Appendix A. WTG Coordinates

All coordinates are in EPSG:28354 – GDA94 / MGA zone 54

WTG ID	Easting	Southing
WTG001	728573	5804228
WTG002	729140	5804624
WTG003	729152	5803805
WTG004	729142	5805578
WTG005	729594	5805022
WTG006	729668	5804423
WTG007	729652	5803732
WTG008	729618	5806018
WTG009	729911	5805438
WTG010	730055	5802579
WTG011	729925	5806482
WTG012	730448	5806215
WTG013	730506	5803989
WTG014	730077	5801901
WTG015	730359	5804681
WTG016	730502	5805215
WTG017	730548	5807366
WTG018	730227	5806921
WTG019	730950	5803214
WTG020	731233	5803689
WTG021	730944	5801750
WTG022	730735	5802458
WTG023	731107	5805954
WTG024	731049	5804994
WTG025	731284	5800681
WTG026	731276	5800095
WTG027	731265	5806450
WTG028	730292	5803485
WTG029	731431	5801260
WTG030	731421	5807220
WTG031	731437	5799551
WTG032	731538	5802015
WTG033	731523	5805139

WTG ID	Easting	Southing
WTG034	731717	5800352
WTG035	731872	5799816
WTG036	731314	5804302
WTG037	731984	5798751
WTG038	732105	5799295
WTG039	732107	5803861
WTG040	732173	5801533
WTG041	732409	5806935
WTG042	732159	5805035
WTG043	732277	5806250
WTG044	732197	5804374
WTG045	732500	5798741
WTG046	732605	5799354
WTG047	733749	5801235
WTG048	732691	5799867
WTG049	732715	5805712
WTG050	732780	5806458
WTG051	732884	5805071
WTG052	732905	5804118
WTG053	733119	5799424
WTG054	733165	5806059
WTG056	733331	5800134
WTG057	733369	5804438
WTG058	733407	5798787
WTG059	733574	5800651
WTG060	733482	5805112
WTG061	733670	5805626
WTG062	734178	5801578
WTG064	734005	5804301
WTG065	734011	5799324
WTG066	734098	5803605
WTG067	734232	5797856
WTG068	734605	5801928
WTG069	734357	5800123
WTG070	736324	5803127

WTG ID	Easting	Southing
WTG071	734478	5800796
WTG072	734569	5799380
WTG073	734579	5797024
WTG074	734601	5803406
WTG075	734752	5797609
WTG076	735064	5797151
WTG077	735083	5800173
WTG078	735151	5803475
WTG079	735367	5801566
WTG080	735428	5800989
WTG081	735571	5797531
WTG082	735612	5803684
WTG083	735771	5799337
WTG084	735792	5802171
WTG085	735795	5800004
WTG086	735900	5798769
WTG087	735911	5797893
WTG088	735913	5802745
WTG089	736156	5801512
WTG090	736275	5797142
WTG091	736303	5799811
WTG092	736952	5798397
WTG093	736703	5799033
WTG094	736796	5799967
WTG095	736603	5797799
WTG096	737421	5796918
WTG097	737531	5799092
WTG098	737585	5798434
WTG099	737621	5799682
WTG100	737812	5797380
WTG101	738035	5796813
WTG102	738181	5797741
WTG103	738179	5798983
WTG104	738345	5796341
WTG105	738480	5798374

WTG ID	Easting	Southing
WTG106	738571	5796958
WTG107	738607	5799257
WTG108	738928	5795373
WTG109	739018	5794481
WTG110	739250	5799325
WTG111	739173	5795948
WTG112	739197	5798745
WTG113	739628	5794893
WTG114	739777	5799925
WTG115	739873	5796901
WTG116	740004	5799325
WTG117	740015	5794428
WTG118	740094	5798140
WTG119	740093	5797433
WTG120	740250	5800102
WTG121	740323	5798812
WTG122	740703	5800557
WTG123	740592	5793835
WTG124	740625	5794588
WTG125	740438	5795137
WTG126	740703	5796599
WTG127	740814	5799874
WTG128	740860	5793194
WTG129	741214	5800761
WTG130	741014	5799230
WTG131	741151	5794143
WTG132	741234	5796295
WTG133	741318	5800150
WTG134	741373	5795737
WTG135	741556	5798769
WTG136	741668	5796990
WTG137	741692	5799663
WTG138	741763	5800628
WTG139	741890	5794055
WTG140	741892	5792921

WTG ID	Easting	Southing
WTG141	741580	5793465
WTG142	742024	5798974
WTG143	742048	5796289
WTG144	742263	5794778
WTG145	742384	5796988
WTG146	742430	5794137
WTG147	742531	5798242
WTG148	742537	5792850
WTG149	742553	5798872
WTG150	742752	5797444
WTG151	742717	5795499
WTG152	742978	5794887
WTG153	743030	5792791
WTG154	743032	5796204
WTG155	743070	5793467
WTG156	743162	5796841
WTG157	743091	5798428
WTG158	743343	5789093
WTG159	743374	5795450
WTG160	743386	5794099
WTG161	743290	5797844
WTG162	743397	5788550
WTG163	743538	5792731
WTG164	743563	5797329
WTG165	743691	5789488
WTG166	743718	5796079
WTG167	743863	5794699
WTG168	744038	5789006
WTG169	743910	5788436
WTG170	744031	5796684
WTG171	744177	5789614
WTG172	744249	5792765
WTG173	744252	5793336
WTG174	744634	5788942
WTG175	744673	5789513

WTG ID	Easting	Southing
WTG176	744609	5796010
WTG177	744611	5793750
WTG178	744769	5792707
WTG179	745084	5789201
WTG180	745191	5794463
WTG181	745106	5796496
WTG182	745286	5793646
WTG183	745299	5792734
WTG184	745556	5795088
WTG185	745601	5795990
WTG186	745752	5796849
WTG187	745890	5795480
WTG188	745897	5794461
WTG189	745921	5792760
WTG190	746052	5793622
WTG191	746059	5796243
WTG192	746315	5796726
WTG193	746435	5793018
WTG194	746949	5794811
WTG195	746665	5793576
WTG196	747046	5795768
WTG197	747208	5792803
WTG198	747038	5794081
WTG199	747584	5794858
WTG200	747420	5793402
WTG201	747626	5794063
WTG202	747814	5792850
WTG203	747638	5795478
WTG204	748114	5794900
WTG205	748108	5794213
WTG206	747996	5793519
WTG207	748288	5793036
WTG208	748481	5795331
WTG209	748611	5794145
WTG210	748732	5794771

WTG ID	Easting	Southing
WTG211	748857	5793608
WTG212	749161	5795217
WTG213	749222	5794664
WTG214	749238	5794071
WTG215	750170	5790441
WTG216	750659	5790531
WTG217	750618	5791156

Appendix B. Full Shadow Flicker Results (V162)

All coordinates are in EPSG:28354 – GDA94 / MGA zone 54

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
D35 - a	725951	5805306	Neighbour	0:00
F32 - a	727015	5802349	Neighbour	0:00
F35 - a	727236	5805534	Neighbour	0:00
G30 - a	728994	5800930	Neighbour	0:00
G35 - b	728737	5805100	Host	78:17
H28 - a	729859	5798327	Neighbour	0:00
H30 - a	729369	5800291	Neighbour	0:00
H32 - a	729073	5802087	Neighbour	55:01
H32 - b	729369	5802123	Host	153:08
H37 - a	729072	5807342	Host	0:00
H38 - a	729116	5808096	Neighbour	0:00
H38 - b	729285	5808898	Neighbour	0:00
I26 - a	730060	5796521	Neighbour	0:00
I39 - a	730161	5809849	Neighbour	0:00
J28 - a	731263	5798929	Host	97:01
K27 - a	732346	5797615	Neighbour	0:00
K30 - a	732563	5800781	Host	31:45
K32 - a	732993	5802497	Host	0:00
L25 - a	733029	5795769	Neighbour	0:00
L26 - a	733373	5796960	Neighbour	0:00
L32 - a	733047	5802703	Host	0:00
L33 - a	733445	5803136	Host	73:07
L38 - a	733936	5808242	Neighbour	0:00
L38 - b	733229	5808692	Neighbour	0:00
L39 - a	733258	5809770	Neighbour	0:00
L39 - b	733422	5809554	Neighbour	0:00
L39 - c	733411	5809378	Neighbour	0:00
L39 - d	733548	5809456	Neighbour	0:00
L39 - e	733978	5809056	Neighbour	0:00
L39 - f	733930	5809110	Neighbour	0:00
M24 - a	734445	5794808	Neighbour	0:00

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
M24 - b	734394	5794808	Neighbour	0:00
M28 - a	734156	5798638	Host	38:51
M34 - a	734796	5804089	Host	71:33
M35 - a	734161	5805068	Host	91:30
M35 - b	734679	5805841	Neighbour	29:04
M37 - a	734049	5807888	Neighbour	0:00
M37 - b	734617	5807932	Neighbour	0:00
M37 - c	734822	5807599	Neighbour	0:00
M37 - d	734842	5807361	Neighbour	0:00
M38 - a	734342	5808410	Neighbour	0:00
N25 - a	735734	5795678	Neighbour	0:00
N25 - b	735596	5795705	Neighbour	0:00
N26 - a	735644	5796755	Host	178:48
N28 - a	735286	5798317	Host	77:40
N32 - a	735097	5802650	Host	33:47
N36 - a	735394	5806857	Neighbour	0:00
N36 - b	735629	5806537	Neighbour	0:00
N36 - c	735753	5806766	Neighbour	0:00
N37 - a	735309	5807414	Neighbour	0:00
O24 - a	736740	5794684	Neighbour	0:00
O30 - a	736089	5800639	Host	72:37
O32 - a	736392	5802326	Host	201:49
O34 - a	736250	5804496	Neighbour	0:00
O34 - b	736302	5804484	Neighbour	0:00
P24 - a	737032	5794683	Neighbour	0:00
P24 - b	737293	5794965	Neighbour	0:00
P25 - a	737560	5795728	Host	38:29
P31 - a	737563	5801100	Neighbour	0:00
P31 - c	737462	5801204	Neighbour	0:00
P32 - a	737308	5802776	Neighbour	23:18
Q30 - a	738605	5800832	Neighbour	0:00
Q31 - a	738592	5801449	Neighbour	0:00
Q31 - b	738434	5801699	Neighbour	0:00
Q31 - c	738632	5801871	Neighbour	0:00

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
Q31 - e	738967	5801890	Neighbour	0:00
Q31 - f	738733	5801881	Neighbour	0:00
Q31 - g	738785	5801858	Neighbour	0:00
Q31 - h	738828	5801838	Neighbour	0:00
Q31 - i	738852	5801805	Neighbour	0:00
Q31 - j	738886	5801813	Neighbour	0:00
Q31 - k	738901	5801800	Neighbour	0:00
Q31 - l	738922	5801794	Neighbour	0:00
Q31 - m	738791	5801735	Neighbour	0:00
Q31 - o	738965	5801387	Neighbour	0:00
Q31 - p	738734	5801410	Neighbour	0:00
Q32 - a	738225	5802138	Neighbour	0:00
Q32 - b	738341	5802115	Neighbour	0:00
Q32 - c	738402	5802176	Neighbour	0:00
Q32 - d	738354	5802214	Neighbour	0:00
Q32 - e	738723	5802232	Neighbour	0:00
Q32 - f	738594	5802128	Neighbour	0:00
Q32 - g	738769	5802008	Neighbour	0:00
Q34 - a	738393	5804213	Neighbour	0:00
Q35 - a	738259	5805321	Neighbour	0:00
R27 - a	739006	5797794	Host	74:40
R31 - aa	739526	5801566	Neighbour	0:00
R31 - ab	739349	5801407	Neighbour	0:00
R31 - ad	739668	5801376	Neighbour	0:00
R31 - ai	739170	5801275	Neighbour	0:00
R31 - aj	739146	5801363	Neighbour	0:00
R31 - ak	739292	5801418	Neighbour	0:00
R31 - al	739182	5801416	Neighbour	0:00
R31 - am	739182	5801499	Neighbour	0:00
R31 - an	739132	5801532	Neighbour	0:00
R31 - ao	739070	5801564	Neighbour	0:00
R31 - ap	739420	5801443	Neighbour	0:00
R31 - aq	739450	5801493	Neighbour	0:00
R31 - ar	739402	5801462	Neighbour	0:00

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
R31 - as	739355	5801496	Neighbour	0:00
R31 - at	739367	5801474	Neighbour	0:00
R31 - av	739381	5801528	Neighbour	0:00
R31 - aw	739370	5801553	Neighbour	0:00
R31 - ax	739294	5801500	Neighbour	0:00
R31 - az	739497	5801582	Neighbour	0:00
R31 - b	739619	5801552	Neighbour	0:00
R31 - ba	739575	5801533	Neighbour	0:00
R31 - bb	739227	5801576	Neighbour	0:00
R31 - bc	739220	5801563	Neighbour	0:00
R31 - bd	739214	5801548	Neighbour	0:00
R31 - be	739427	5801190	Neighbour	0:00
R31 - bf	739096	5801908	Neighbour	0:00
R31 - c	739104	5801611	Neighbour	0:00
R31 - d	739706	5801597	Neighbour	0:00
R31 - f	739045	5801510	Neighbour	0:00
R31 - g	739245	5801523	Neighbour	0:00
R31 - h	739254	5801555	Neighbour	0:00
R31 - j	739397	5801638	Neighbour	0:00
R31 - k	739370	5801644	Neighbour	0:00
R31 - n	739324	5801676	Neighbour	0:00
R31 - q	739009	5801990	Neighbour	0:00
R31 - r	739050	5801658	Neighbour	0:00
R31 - s	739122	5801682	Neighbour	0:00
R31 - t	739160	5801671	Neighbour	0:00
R31 - u	739179	5801657	Neighbour	0:00
R31 - v	739202	5801649	Neighbour	0:00
R31 - w	739214	5801639	Neighbour	0:00
R31 - z	739198	5801563	Neighbour	0:00
R32 - a	739051	5802266	Neighbour	0:00
R32 - b	739072	5802112	Neighbour	0:00
R32 - c	739059	5802044	Neighbour	0:00
R32 - d	739014	5802017	Neighbour	0:00
R32 - e	739971	5802442	Neighbour	0:00

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
R33 - a	739269	5803149	Neighbour	0:00
T17 - a	741311	5787868	Neighbour	0:00
T17 - b	741231	5787929	Neighbour	0:00
T24 - a	741497	5794967	Host	106:59
T27 - a	741991	5797694	Host	101:37
T32 - a	741562	5802587	Neighbour	0:00
T32 - b	741355	5802435	Neighbour	0:00
U18 - a	742345	5788139	Neighbour	22:28
U18 - b	742149	5788761	Neighbour	0:00
U18 - c	742105	5788742	Neighbour	0:00
U31 - a	742715	5801859	Neighbour	0:00
U32 - a	742962	5802812	Neighbour	0:00
V18 - a	743717	5788539	Host	398:12
V20 - a	743847	5790367	Host	0:00
V30 - a	743058	5800426	Neighbour	0:00
V32 - a	743040	5802814	Neighbour	0:00
W17 - a	744971	5787817	Neighbour	0:00
W20 - a	744108	5790465	Host	0:00
W21 - a	744079	5791417	Host	0:00
W21 - b	744354	5791698	Host	0:00
W25 - a	744707	5795176	Host	33:56
W25 - b	744836	5795147	Host	92:18
W27 - i	744847	5797923	Neighbour	0:00
W28 - a	744889	5798050	Neighbour	0:00
X18 - a	745581	5788298	Neighbour	0:00
Y28 - a	746420	5798391	Neighbour	0:00
Y28 - b	746653	5798644	Neighbour	0:00
Z20 - a	747119	5790617	Host	0:00
Z20 - b	747303	5790693	Host	0:00
Z25 - a	747970	5795356	Host	286:22
Z28 - a	747222	5798153	Neighbour	0:00
AA25 - a	748193	5795262	Host	324:29
AA27 - a	748944	5797036	Neighbour	0:00
AA27 - b	748226	5797449	Neighbour	0:00

Dwelling	Easting	Southing	Dwelling Status	Shadow Flicker (Hrs:Mins per Annum)
AB18 - a	749623	5788015	Neighbour	0:00
AC17 - a	750863	5787865	Neighbour	0:00
AC18 - a	750884	5788946	Neighbour	0:00
AC22 - a	750874	5792218	Neighbour	0:00
AC22 - b	750698	5792190	Host	0:00
AD23 - a	751141	5793676	Neighbour	0:00
AD24 - a	751495	5794790	Host	0:00
AD25 - a	751723	5795944	Neighbour	0:00
AE18 - a	752191	5788243	Neighbour	0:00

Appendix C. Shadow Flicker Map (V162)

